BRITISH MEDICAL JOURNAL

LONDON SATURDAY APRIL 11 1942

CHANGES IN HAEMOGLOBIN CONCENTRATION AND PLASMA SPECIFIC GRAVITY FOLLOWING PLASMA TRANSFUSIONS

BY

J. BEATTIE, M.D., D.Sc.

Bernhard Baron Research Laboratories, Royal College of Surgeons of England

The reduction in the haemoglobin concentration of the blood following the rapid transfusion of a known quantity of plasma has been used as a means of calculating the pre-transfusion blood volume (Robertson and Bock, 1919; Scholander, 1938; and Bushby, Kekwick, and Whitby, 1940). This method makes several assumptions: (1) that complete mixing of the plasma with *all* the circulating blood takes place; (2) that the number of red cells in circulation during transfusion and mixing remains constant; and (3) that the plasma volume after transfusion and mixing is equal to the volume of plasma before transfusion plus the volume of plasma transfused. If one or more of these assumptions is incorrect, the blood volumes estimated may differ considerably from the true blood volume. Again, it has been assumed (Hayward, 1942) that when the haemoglobin concentration returns to its pre-transfusion level the volume of plasma transfused has been eliminated from the blood stream. This assumption implies that the only factor which causes an increase in haemoglobin concentration is the movement of fluid from the blood. It is important, therefore, to examine any evidence which throws light on the validity or otherwise of these fundamental assumptions.

The following observations, made during an investigation into the physical and chemical changes in the blood after transfusion of plasma, concern variations in haemoglobin concentration and plasma protein content of the blood found in animals during the first hour after rapid plasma transfusions. Their bearing on the above assumptions will be discussed.

Methods

Cats anaesthetized with nembutal injected intraperitoneally (44 mg. per kg. of body weight) were used. No plasma injection was given until 4 hours after induction of anaesthesia. This was to allow for the disappearance of an increase in plasma volume (10%) which follows nembutal anaesthesia (Hamlin and Gregersen, 1939). Blood samples were taken from a femoral artery, and plasma was injected through a femoral vein. The animals were heparinized during the experiment and plasma from heparinized animals was employed for transfusion. In 2 experiments (Nos. 94 and 95) the plasma was diluted with Ringer-Locke solution. Blood samples did not exceed 1 c.cm. each. Haemoglobin estimations were made by the alkaline haematin method, using a photo-electric colorimeter. Plasma proteins were estimated by the specific gravity method of Barbour and Hamilton (1926) and controlled by direct determinations by the biuret method of Robinson and Hogden (1940). Plasma protein values were calculated from the plasma S.G. by the formula of Weech, Reeves, and Goettsch (1936). Such values were within ±1.5% of those obtained by the biuret method. The plasma S.G. value was accurate to ±1 in the fourth place—i.e., a value of 1.0279 might be 1.0278 or 1.0280, which gives an error of ±0.5% in terms of plasma protein.

Plasma volumes as determined are accurate to within ±3% (dye method), and the blood volumes were calculated from these by multiplying by 100 and dividing by the plasma percentage (haematocrit) determined from a femoral artery blood sample.

Plasma Specific Gravity

Thirteen normal animals were each given a single plasma transfusion and the changes in plasma specific gravity were then observed (Table I). If the transfused plasma mixed completely with the animal's plasma and no fluid or plasma protein entered or left the blood stream, the S.G. after mixing can be calculated from the following formula:

$$PV_1 \times SG_1 + PV_2 \times SG_2 = (PV_1 + PV_2)SG_3$$

where PV_1 is the plasma volume before transfusion, PV_2 the volume of plasma transfused, SG_1 the S.G. of the animal's plasma before transfusion, SG_2 the S.G. of the transfused plasma, and SG_3 the S.G. of the animal's plasma after mixing has taken place. This calculated value (SG_3) is to be found in the last column of Table I. Of the 53 observations, 10 were below the calculated value, 4 were the same as this value, and 39 were above it. The 10 observations below the calculated value were distributed as follows: 8 were less than 5 points below the expected value, and 2 were between 6 and 9 points below. In contrast, the 39 observations above the calculated value showed much greater discrepancies: 9 were 1 to 5 points above the expected value, 9 were 6 to 10 points above, 12 were 11 to 15 points above, 8 were 16 to 20 points above, and 1 was 21 points above.

Haemoglobin Concentrations

The haemoglobin concentrations were followed in 10 of the 13 animals. The values were expressed as percentages of the control value before transfusion began. If it be assumed (1) that

TABLE I

No.	Plasma Vol. before 1st Injection (c.cm.)	Plasma S.G. before 1st Injection	Volume of Plasma Injected (c.cm.)	S.G. of Plasma Injected	S.G. of Plasma after Injection										Calculated Plasma S.G.
					S.G.	Min. after	S.G.	Min. after	S.G.	Min. after	S.G.	Min. after	S.G.	Min. after	
70	144	1·0290	20	1·0287	1·0297	3	1·0288	5	1·0302	20	1·0305	30	1·0304	45	1·0289
72	168	1·0276	16	1·0293	1·0279	9	1·0277	24	1·0282	39	—	—	—	—	1·0277
73	92	1·0297	20	1·0266	1·0302	10	1·0307	25	1·0302	40	1·0302	55	—	—	1·0291
74	123	1·0299	20	1·0244	1·0302	8	1·0291	23	1·0293	38	1·0291	120	—	—	1·0291
90	117	1·0284	19	1·0284	1·0282	8	1·0286	13	1·0291	28	1·0293	43	—	—	1·0284
91	87	1·0313	10	1·0270	1·0323	9	1·0316	14	1·0306	28	—	—	—	—	1·0309
92	195	1·0265	20	1·0247	1·0281	10	1·0282	16	1·0279	26	1·0273	41	—	—	1·0263
93	104	1·0321	15	1·0279	1·0316	10	1·0307	16	1·0308	26	1·0319	42	—	—	1·0316
94	214	1·0304	30	1·0210	1·0297	10	1·0289	15	1·0293	22	1·0289	39	1·0289	54	1·0292
95	252	1·0304	50	1·0222	1·0301	11	1·0296	16	1·0300	30	1·0296	45	1·0292	60	1·0290
96	111	1·0232	16	1·0270	1·0255	10	1·0250	15	1·0248	27	1·0248	42	1·0246	59	1·0237
100	151	1·0295	20	1·0253	—	—	1·0311	25	1·0309	40	1·0308	55	—	—	1·0290
106	124	1·0283	20	1·0259	1·0292	10	1·0277	25	1·0280	40	1·0278	55	—	—	1·0279

complete mixing of the transfused plasma with the animal's blood takes place, (2) that the total haemoglobin in circulation remains constant during the injection and mixing of the plasma, and (3) that the plasma volume after transfusion and mixing is equal to the sum of the pre-transfusion plasma volume and the volume of plasma transfused, then, provided the blood volume is known, the expected haemoglobin concentration can be calculated from the following formula:

$$\frac{BV}{BV+V} = \frac{Hb_2}{Hb_1};$$

where BV is the blood volume before plasma transfusion, V the volume of plasma transfused, Hb_1 and Hb_2 the haemoglobin concentrations before and after transfusion. The value of Hb_2 can thus be compared with the observed values. The time allowed for mixing was not less than 8 and not more than 13 minutes. The observed and calculated values are listed in Table II.

TABLE II

No.	Blood Vol. before Plasma Injection (c.cm.)	Vol. of Plasma Injected (c.cm.)	Observed Hb Conc. before Plasma Injection (% of Control)	Calculated Hb Conc. after Plasma Injection (% of Control)	Observed Hb Concentration after Plasma Injection							
					Hb Conc.	Min. after	Hb Conc.	Min. after	Hb Conc.	Min. after	Hb Conc.	Min. after
72	285	16	100·0	94·4	95·2	9	96·3	24	99·8	39	—	—
73	154	20	100·0	88·5	92·5	10	89·7	25	94·6	40	96·7	55
90	188	19	111·5	101·3	104·3	8	102·1	13	103·3	28	107·1	43
91	142	10	98·3	91·9	97·8	9	99·4	14	97·2	28	—	—
92	308	20	102·0	95·8	95·9	10	97·5	16	97·8	26	97·0	41
93	154	15	103·2	94·0	99·8	10	101·3	16	102·3	26	103·7	41
94	352	30	102·9	94·8	97·9	10	97·9	15	97·5	22	99·1	39
95	350	50	99·4	87·0	99·2	11	91·3	16	90·2	30	91·9	45
100	227	20	100·0	91·9	93·7	10	95·3	25	94·6	40	93·7	55
106	215	20	100·0	91·5	92·4	10	92·4	25	93·0	40	93·5	55

No.	Hb Conc.	Min. after
72	—	—
73	—	—
90	—	—
91	—	—
92	—	—
93	—	—
94	99·4	54
95	92·1	60
100	—	—
106	—	—

If the same assumptions are made as in the above calculation, but the observed value of Hb_2 is used, then the blood volume can be calculated from the same formula and compared with that determined from the plasma volume and haematocrit reading. These values are listed in Table III.

TABLE III

No.	Direct Blood Volume Estimation (c.cm.)	Blood Volume Calculated from Reduction in Hb Content (c.cm.)	No.	Direct Blood Volume Estimation (c.cm.)	Blood Volume Calculated from Reduction in Hb Content (c.cm.)
72	285	317	93	154	440
73	154	247	94	352	587
90	188	275	95	350	2,480
91	142	1,956	100	227	297
92	308	314	106	215	243

It will be noted that the calculated haemoglobin values in Table II are lower than those actually observed between 8 and 13 minutes after the end of the transfusion. The blood volumes calculated from the haemoglobin concentrations (Table III) are higher—even fantastically higher—than those determined from the plasma volume and haematocrit.

Discussion

In the observations listed in Table I the plasma S.G. values are in many instances in excess of those of the animal's plasma before transfusion and of the plasma transfused. At first sight it might be supposed that translocation of fluid from the blood stream might explain such findings. If this were so, then a rise in plasma S.G. ought to be correlated with a rise in haemoglobin concentration. A comparison of Table I with Table II shows clearly that there is no parallelism between the two sets of observations.

If it be assumed that the total quantity of plasma protein in the blood stream remains constant or varies but slightly during a period of one hour after a plasma transfusion in a normal animal, then the amount of fluid which would have to move out of or into the blood stream to produce the changes in plasma S.G. recorded in Table I can be calculated from the formula:

$$PV_1 \times SG_1 + PV_2 \times SG_2 - F \times SG_3 = (PV_1 + PV_2 - F)SG_4, \text{ or}$$

$$F = \frac{PV_1(SG_4 - SG_1) + PV_2(SG_4 - SG_2)}{SG_4 - SG_3};$$

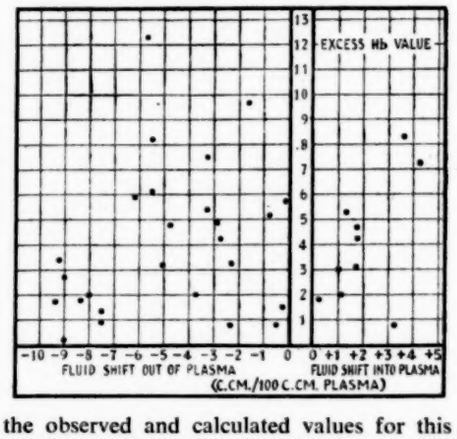
where PV_1 is the plasma volume before the injection of plasma, PV_2 the volume of plasma transfused, F the volume of protein-free fluid which leaves the blood stream, and SG_1, SG_2, SG_3, and SG_4 are the specific gravities of the pre-injection plasma, the plasma injected, the protein-free fluid, and the plasma after injection, respectively. As it is assumed that the total plasma protein remains constant, then the fluid which is translocated must be regarded as protein-free. Its S.G. is taken as 1.0069. Calculating the value of F from this formula, the figures in Table IV are obtained. Out of 53 values, 12 indicate movement of fluid into the plasma, and the remaining 41 a loss of fluid by the plasma. (One observation at 120 minutes is omitted.)

TABLE IV

No.	Plasma Vol. before 1st Injection (c.cm.)	Vol. of Plasma Injected (c.cm.)	Fluid Shift After Injection									
			Fluid Shift (c.cm.)	Min. after	Fluid Shift (c.cm.)	Min. after	Fluid Shift (c.cm.)	Min. after	Fluid Shift (c.cm.)	Min. after	Fluid Shift (c.cm.)	Min. after
70	144	20	−5·3	3	+4·4	5	−9·1	20	−11·2	30	−13·1	45
72	168	16	−0·8	9	+0·4	24	−3·9	39	—	—	—	—
73	92	20	−5·1	10	−7·3	25	−5·1	40	−5·1	55	—	—
74	123	20	−6·6	8	+2·0	23	−1·1	38	−2·0	120	—	—
90	117	19	+1·3	8	−2·8	13	−4·3	28	−5·5	43	—	—
91	87	10	−5·5	9	−2·9	14	+1·1	28	—	—	—	—
92	195	20	−17·9	10	−18·8	16	−16·1	26	−15·1	41	—	—
93	104	15	−0·1	10	+4·4	16	+3·8	26	−1·6	41	—	—
94	214	30	−4·9	10	+3·8	15	−0·6	22	+3·8	39	+3·8	54
95	252	50	−14·4	11	−7·4	16	−12·5	30	−7·4	45	−2·1	60
96	111	16	−12·4	10	−9·3	15	−8·0	27	−8·0	42	−6·6	59
100	151	20	—	—	−14·8	25	−13·5	40	−12·8	55	—	—
106	124	20	−8·0	10	+4·0	25	−0·2	40	+1·2	55	—	—

\+ before figures for fluid shift indicates fluid entering blood stream.
− " " " " " " " leaving " "

If the red cell population be regarded as constant within the same period of one hour, then the discrepancy between the observed and calculated haemoglobin values may be due to experimental errors in the method of estimating the total blood volume or haemoglobin concentration, or to movement of fluid from the blood. If one observation from each animal at the time nearest to 30 minutes be taken, the mean difference



between the observed and calculated values for this group is +4.31 and the standard error is ±0.625. Included in the standard error are all operative sources of error. There is thus no doubt that a significant discrepancy exists between the calculated and the observed haemoglobin values. If the variations in this discrepancy are regarded as due to movement of blood fluid, then the greater the discrepancy the greater the alteration in plasma volume should be.

The amount of protein-free fluid moving out of or into the blood stream required to satisfy the observed variations in plasma S.G. are given in Table IV. If these values are reduced

to a shift of fluid in c.cm. per 100 c.cm. of plasma and plotted against the discrepancies between the observed and the calculated haemoglobin values, no correlation between these sets of variables is apparent (see Graph above). Differences between observed and calculated haemoglobin concentrations cannot, therefore, be accounted for on the basis of a shift of protein-free fluid from the blood stream.

It has been pointed out above that if blood volumes are calculated from the observed haemoglobin values after plasma transfusion, the results are of little value owing to the high values obtained. Hayward (1942), in a series of 8 cases of peripheral vascular disease, studied the effects of serum transfusion on, among other observations, the haemoglobin concentration and packed cell volume (haematocrit). In his Table I he gave the values of these two estimations before and after transfusion and stated that by following the changes in them he was able to observe the alterations in blood volume. By using the formula for estimating blood volumes mentioned above, the values of the blood volumes can be obtained. These are given in Table V. It will be noted that out of the 8 values obtained

TABLE V

Case No.	Blood Volume from Hb Values (c.cm.)	Blood Volume from Haematocrit Values (c.cm.)	Case No.	Blood Volume from Hb Values (c.cm.)	Blood Volume from Haematocrit Values (c.cm.)
1	3,792	6,300	6	7,345	4,089
2	10,286	7,733	8	6,800	5,354
4	5,784	6,000	9	2,400	—
5	4,800	3,160	13	4,350	—

from the haemoglobin determinations, 4 and probably 5 are higher than the normal human blood volume. Three—probably 4—obtained from haematocrit readings are higher than the normal value.

In the experimental series listed in Table III all the blood volumes but one were much higher than those calculated by a direct method. It seems not unreasonable to suppose that the same factors which are operating to produce a discrepancy between the expected and observed haemoglobin values in the animals may also operate in man. If the discrepancy cannot be explained in the animals by supposing a shift of protein-free fluid, it is unlikely that such a shift is sufficient to explain the discrepancies in the blood-volume estimations calculated from Hayward's data.

Hahn *et al.* (1942) have shown that the red cell volume as determined by the plasma volume - haematocrit method gives values 10% to 40% in excess of the true red cell volume. The reasons for this disparity were pointed out by Fahraeus (1929) and emphasized by Stead and Ebert (1941). If the plasma volume as determined by the dye method is regarded as accurate to within ±3% (after allowance has been made to ensure that the two phases in the mixing of the dye with the plasma have been completed; Hahn *et al.*, 1942), then the true blood volume in the experiments in the present series must be less than that actually determined by the plasma volume - haematocrit method. The calculated haemoglobin value after plasma transfusion must therefore be lower than the figure given, and hence the disparity between the observed and the calculated haemoglobin values should be much greater than those recorded here.

If it be assumed that a rapid transfusion of plasma requires an increase in the capacity of the capillary bed to accommodate the increase in blood volume, then each of these newly opened capillaries will be lined with a film of cell-free plasma moving sluggishly in comparison with the axial stream of corpuscles and plasma. The quantity of plasma required to form this film has been estimated by Hahn *et al.* (1942) as 21% of the plasma volume. Therefore, of the plasma transfused, about 79% only will be available to mix with the axial streams and so to "dilute" the circulating blood. Modifying the original formula for calculating the expected haemoglobin concentration to

$$\frac{BV}{BV+\frac{79V}{100}}=\frac{Hb_2}{Hb_1}$$

and calculating the expected haemoglobin concentration, the values in Table VI are obtained. The observed values used for

TABLE VI

No.	Expected Hb Conc. (100% V) A	Expected Hb Conc. (79% V) B	Observed Hb Conc. C	Discrepancy between C and B
72	94·4	95·7	95·2	−0·5
73	88·5	90·7	92·5	+1·8
90	101·3	103·2	104·3	+1·1
91	91·9	93·1	97·8	+4·7
92	95·8	97·0	95·9	−1·1
93	94·0	95·8	99·8	+4·0
94	94·8	96·4	97·9	+1·5
95	87·0	89·3	99·2	+9·9
100	91·9	93·5	93·7	+0·2
106	91·5	93·2	92·4	−0·8

comparison are those recorded between 8 and 11 minutes after the end of the transfusion. The discrepancies in 7 out of 10 are less than 2%, and 3 are between 4 and 10%. It would appear, therefore, that the immobilization of plasma to form such peripheral films is a factor of some importance. If loss of protein-free fluid from the blood stream is the other factor operating to produce the large discrepancies still remaining in Nos. 91, 93, and 95, then there ought to be some parallelism between the calculated fluid loss (Table IV) and the haemoglobin discrepancies. A comparison of these values shows that a movement of protein-free fluid alone cannot be the explanation.

One is forced to the conclusion that the assumption that only protein-free fluid moves into or out of the blood stream during the period of observation is untenable. As Whipple and his school have demonstrated the ease with which plasma protein can be translocated from plasma to cells and from cells to plasma, it seems probable that movement of substantial amounts of fluid containing plasma proteins does take place after plasma transfusions. Plasma transfusions, therefore, in normal animals, and probably also in man, cannot be used to estimate blood volumes, because, first, fluid leaves the blood stream in substantial amounts over short periods of time, and, secondly, all the plasma transfused is not used to "dilute" the circulating blood. A return of the haemoglobin concentration to its pre-transfusion value could take place with a total plasma volume still in excess of the pre-transfusion volume. Plasma can remain immobilized as a surface film without being concerned in the ratio of cells to plasma in rapid circulation.

Summary

Intravenous transfusions of plasma into anaesthetized animals are followed by changes in haemoglobin concentration and plasma protein content which cannot be explained on the basis of a simple mechanical mixing of the transfused plasma with the circulating blood. The formation of surface films of plasma in capillaries opened up to receive the transfused plasma reduces the amount of plasma available for dilution of the circulating blood and leads to high haemoglobin values with consequent high estimates of blood volume. Movement of protein-free fluid from the blood stream cannot account for the observed changes in plasma S.G. and haemoglobin concentration. Movement of plasma proteins probably occurs simultaneously with this fluid shift.

I am indebted to Dr. R. B. Fisher for his help and criticism, and to Miss H. B. Collard for her assistance in the experimental work.

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Prof. Aloysio de Castro, president of the Academy of Medicine in Rio de Janeiro and director of the general policlinic, has been given a doctorate *honoris causa* by the faculty of medicine of Buenos Aires.

CHANGES IN BLOOD VOLUME FOLLOWING TRANSFUSIONS OF SERUM OR PLASMA AND FATE OF INJECTED PROTEIN

A PRELIMINARY REPORT

BY

GRAHAM W. HAYWARD, M.D., M.R.C.P.

Physician, E.M.S.; Chief Assistant to the Medical Professorial Unit, St. Bartholomew's Hospital

AND

ARTHUR JORDAN, M.B., B.S., D.Sc.

Assistant Pathologist, E.M.S.; Junior Demonstrator of Chemical Pathology, St. Bartholomew's Hospital

The widespread use of intravenous serum or plasma in recent months has aroused interest in the effect of these transfusions on the blood volume and in the fate of the transfused protein. The present observations on changes in the blood volume and the fate of the serum protein were made on normal patients and on a series of patients with peripheral vascular disease who, in the course of another investigation, were receiving weekly injections of serum or plasma (Hayward, 1942).

Changes in plasma volume following injection of saline and dextrose solution have been studied by Gilligan, Altschule, and Volk (1938), using both dye methods and changes in the haemoglobin and haematocrit. They found that the increase in plasma volume after such transfusions is a transient one, usually lasting for only two hours. They also confirmed that changes in the haemoglobin and haematocrit give a reliable index of changes in plasma volume.

Few observations on the effect of transfusion of serum or plasma on the blood volume of normal patients are available, although the use of this substance is widespread. Freeman and Wallace (1938) gave serum intravenously to dogs and found that the blood volume was restored to normal within 24 hours. Using cats, Robertson (1938) found that when blood serum was injected fluid left the vascular system during the injection and continued to leave afterwards, so that an hour after the injection the blood volume was about 15% above the normal. Scimone (1940), in similar experiments on rabbits, found that injected serum disappeared from the circulation in 2 hours, with a return of blood volume to normal. Harper and his fellow workers (1941) concluded that after plasma transfusion in man the haematocrit remained below the level before transfusion for a period up to four days. Hill, McMichael, and Sharpey-Schafer (1940) found that in 2 cases injection of concentrated (4 times normal) serum caused a dilution of the blood volume lasting for over three days.

The importance of the plasma protein in regulating blood volume has been emphasized by Chang (1932). He found that in nephrosis the blood volume was reduced and any rise in plasma protein concentration was accompanied by a rise in plasma volume, and concluded that the plasma protein concentration is one of the regulating factors of circulating volume.

The fate of the injected protein is interesting. There is good evidence from animal experiment that transfused serum protein can be utilized in body metabolism, and will maintain a protein-fasting animal in nitrogenous equilibrium (Helman, Mahoney, and Whipple, 1934). Animals show no increase in urinary nitrogen excretion after transfusion of plasma protein, and it is therefore possible that the protein is stored as such rather than broken down (Weech, Goettsch, and Reeves, 1933; Daft, Robscheit-Robbins, and Whipple, 1938).

Methods

In the present series of cases changes in blood volume after serum or plasma transfusion have been followed by means of estimations of the haemoglobin and haematocrit readings. Most of the haemoglobin estimations were made by the Haldane method. The instrument used was checked against the oxygen capacity method, and 100% was found to equal 18.5 c.cm. of oxygen per 100 c.cm. of blood. Repeated estimations on the same sample of blood showed the standard deviation to be 2.0, and the results reported are taken to be ±4%. A certain number of the haemoglobin estimations were made on the Sahli principle, using a Neoplan haemoglobinometer. On this instrument 100% represented 19.4 c.cm. of oxygen per 100 c.cm. of blood, and the standard deviation of estimations was 2.0. These results were also taken to be ±4%. All the estimations in any series were undertaken by the same observer, using the same instrument on venous blood obtained at the same time each day, and the patients were confined to bed throughout the tests..

The haematocrit readings were made on heparinized blood, and the tube was spun for thirty minutes, always using the same centrifuge. Multiple determinations showed that the results could be reproduced to ±1%.

Blood-urea determinations were made by Archer's modification of the urease-nesslerization method, and estimations of the plasma protein by the biuret method, both described by Harrison (1937).

The serum used was pooled serum and had a total protein content of about 7 gm. per 100 c.cm. In a few cases citrated plasma was given, the protein content of which varied from 4.06 to 6.25 gm. per 100 c.cm.

Results

The initial blood volume was presumed to be normal in most of the patients—in only 5 was there any reason to suppose that it might be low (Cases 22 and 25, low plasma protein oedema; Cases 4 and 6, Buerger's disease; Case 29, nephrosis). In most cases the haemoglobin, and therefore the blood volume, after transfusion of 800 to 1,200 c.cm. of serum or plasma returned to normal in from two to five days (see Table), although in two cases the initial volume was regained in 24 hours. Statistically the haemoglobin values fall immediately after transfusion and

Table showing Changes in the Haemoglobin (Hb) and Haematocrit (Hc) Reading following Intravenous Serum or Plasma

Case		Volume of Fluid Transfused (c.cm.)		On Day of Transfusion		Days Following Transfusion					
				Before	Immediately After	*1	2	3	4	5	6
1	S	1,115	Hb	104	79	93	100	100	105		
			Hc	50·3	42·2		48·6				
2	S	800	Hb	97	90	90	99	91	108		
			Hc	48·2	43·6	42·4	44·6	40·9	48·4		
4 i	S	800	Hb	120	102	107	110	116			
4 ii	S	800	Hb	107	94	96	92	95	107	108	
			Hc	50·9	45·2	44·5	44·5	43·9	47·0	48·0	
5 i	S	800	Hb	100	80	85	95				
5 ii	S	800	Hb	100	87	85	94	99			
5 iii	S	800	Hb	98	84	91	90	93	94	94	99
6 i	S	800	Hb	118*	101	101	104	112			
			Hc	55·0*	45·9	46·0	50·2	53·0			
6 ii	P	1,600	Hb	112	92	100	105	101	107	100	
			Hc	51·2	43·3	45·8	47·5	45·0	48·6	43·2	
8 i	S	800	Hb	114	102	93	95	103	110	114	
			Hc	50·0	43·4	40·0	43·8	46·2	45·6	48·3	
8 ii	P	1,080	Hb	122		109	110	122	118		
			Hc	51·5	42·3	46·2	49·8	52·5	49·9		
11	S	800	Hb	87	65	73	80	80	81	81	
13	S	800	Hb	92	87	87	95				
19 i	S	800	Hb	81	75	80	83	95			
19 ii	S	800	Hb	96	72	83	93				
20	S	1,000	Hb	103	86	88	90	98	102	102	
21	S	1,200	Hb	75	62	65	65	70	74		
22	S	800	Hb	106	72	100	102				
23	S	800	Hb	100	102†	97	108	103			
			Hc	50·9	42†·0	41·1	46·9	43·6			
24	P	1,080	Hb	78	70	70	67	68	76		
			Hc	33·9	30·0	31·1	31·8	33·7	33·4		
25	S	800	Hb	113	107	110	105	109			
			Hc	55·4	47·0	50·8	47·8	52·8			
26	P	1,080	Hb	97	82		84	82			
			Hc	37·8	34·8		38·8				
27	P	1,080	Hb	107	90	98		86			
			Hc	46·4	40·9	43·5		38·1			
28 i	S	1,080	Hb	101	98	99		95	105	105	
			Hc	48·0	45·4	43·1		43·7	46·0	46·2	
28 ii	P	1,080 +400 normal saline	Hb	105	94	96	92	101			
			Hc	45·6	40·8			47·9			
29 i	S	1,000	Hb	131	118	113		95			
29 ii	S	1,000	Hb	108	104	105					

* Hb=112 and Hc=54·0 the previous day.
† 6 hours after transfusion.
Hb and Hc expressed as percentages.
All estimations carried out on venous blood. The case reports of some of these patients will be found, under the same number, in the article by Hayward (1942).
S=Pooled serum. P=Citrated plasma.

return to their pre-transfusion level in three days. On the fourth and fifth days there is no significant lowering of the average haemoglobin value.

The changes in the haematocrit readings confirm the results obtained from haemoglobin determinations. The haematocrit readings did not always return to their initial values when the haemoglobin had returned to normal. Such a difference, if real, must mean that while the haemoglobin content of the individual cells remains unchanged the cell volume decreases. A similar phenomenon has been observed after the intravenous injection of gum acacia (Heckel and others, 1938) and of saline and dextrose (Gilligan, Altschule, and Volk, 1938). No explanation has been given for this curious phenomenon.

The total protein concentration of the circulating plasma was studied in 17 cases after the transfusion of serum (7% protein) or plasma (4 to 6.25% protein). In no case was any significant change found to occur in the plasma protein concentration either immediately after the transfusion or during the period of restoration of the blood volume to its original level, so that the transfused fluid and protein are removed from the circulation together. In 9 of these cases the plasma albumin, and in 6 the plasma fibrinogen, were also studied with similar results. Cases 22 and 25 were examples of oedema due to a low plasma protein concentration of unknown aetiology. Both received 800 c.cm. of serum containing 7% protein, which might be expected to cause a rise of about 0.5% in the plasma protein content. No such rise occurred: the excess of protein must have been removed almost as rapidly as it was injected. The figures actually observed for the total plasma protein on these 2 cases were:

	Case 22	Case 25
Before transfusion	4·5%	4·7%
Immediately after transfusion	4·5%	4·7%
1 day after transfusion	4·25%	4·7%
2 days " "	—	4·7%
3 " "	4·25%	—

The fate of the injected protein is obscure. None appeared in the urine following any transfusion. If metabolism of the excess protein occurs rapidly, some change in the blood urea may be found. The blood urea was studied after 11 transfusions of serum: the results revealed no consistent rise in the blood urea.

Conclusions

Following the transfusion of 800 to 1,200 c.cm. of serum or plasma the initial blood volume is regained in from 2 to 5 days.

The added serum protein is removed from the circulation, none is lost as protein in the urine, and concentration of the blood to its original volume produces no increase in the plasma protein figures. The ultimate fate of the protein is still uncertain.

It is a pleasure to acknowledge the help and advice of Dr. J. W. Trevan, Prof. G. Hadfield, and Prof. R. V. Christie, and the technical assistance of Mr. R. A. Duffett.

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F. R. Moore (*U.S. Naval Bull.*, 1941, **39**, 386) records his observations on eighty cases of gonorrhoea, showing that sulphathiazole is a much more satisfactory drug than either sulphanilamide or sulphapyridine. The percentage of cures was higher, while the average time on the sick list was nearly 45% less than with sulphapyridine and 60% less than with sulphanilamide. There was only one reaction following sulphathiazole, compared with fifteen after sulphapyridine and seventeen after sulphanilamide.

THE LOW NAIL

BY

H. A. BRITTAIN, M.Ch., F.R.C.S.

Senior Orthopaedic Surgeon, Norfolk and Norwich Hospital

In two of the most recent textbooks on fractures published in this country opinion on the treatment of the trochanteric or extracapsular fracture of the neck of the femur differs somewhat. Watson-Jones (1941) advises internal fixation with a Smith-Petersen nail where possible, but considers that the pertrochanteric fracture lies so close to the cortex of the outer surface of the femur that the distal fragment is too thin for successful nailing. Perkins (1940) considers traction in the long axis of the limb sufficient, but admits that recurrence of angulation with shortening is common. In elderly patients he advises that only the saving of life is of importance and that the treatment of the fracture need not be attempted.

Low Fracture of Neck of Femur

Surgical teaching gives the impression that treatment of the low or basal fracture of the neck of the femur is not difficult, as this fracture invariably unites, whatever measures are undertaken. Presumably this is in pleasant contrast with the medial fracture of the neck, which before the use of the Smith-Petersen nail often failed to unite in spite of treatment. Recent progress in fracture therapy has opened our eyes to the fact that mere union of this fracture does not produce a perfect or even a fair result.

In the treatment two factors are paramount:

1. *The Viability of the Patient.*—These patients are frequently old and therefore liable to complications, of which the most usual are bed-sores and pulmonary affections. Nursing the patient on a Thomas splint may be difficult or impossible, and requires at least three months of immobilization. The word "difficult" is used advisedly because this is not impossible, but it calls for such skilled nursing as cannot be available everywhere. Frail and elderly patients do not tolerate plaster-of-Paris easily, and the comfort and the complete relief from pain advertised by the advocates of plaster are often not forthcoming. Here again skilled nursing and the most constant attention by the surgeon are required.

2. *The Maintenance of Position during the Period of Uniting.*—Even with the most careful nursing and application of splint or plaster cast, adduction or external rotation of the distal fragment will take place in the majority of patients. This is a gloomy fact, possibly unwelcome to practitioners well versed in the art of self-deception. It may be said that full movement is unnecessary for these old patients, that the patient is really lucky to survive and get union, and that a limp and a stiff knee are but small handicaps. No one would quarrel with this attitude were it not for the fact that perfect position, rapid union, and painless convalescence may be obtained in a very high percentage by successfully nailing with a Smith-Petersen nail.

If one grants that these premisses are forthcoming there can be no doubt which is the best treatment. A patient whose fracture has been soundly nailed can sit up, turn over, lift the leg, and bend the knee, and by this mobility avoids bed-sores, pulmonary complications, and stiff joints. Furthermore, the nearly vertical position of the nail permits earlier weight-bearing than in the medial fracture, as the shearing strain is better guarded against. Why, then, is low nailing not in vogue?

The chief disadvantages so far published are: (1) It is not necessary, because the fracture joins up in any event; but the disadvantages of mere union have already been pointed out. (2) The operation is difficult because the cortical bone splinters into the fracture: this technical difficulty can be overcome. (3) It is a more formidable operation than the medial nailing, requiring a more extensive exposure.

The operation here described is not severe and takes less than one hour.

Description of Operation

The optimum time is considered to be the third day after fracture, when the primary shock has worn off and before bed-sores or pulmonary complications have appeared. This is, of course, an elastic period. Preliminary "vetting" by a physician

is desirable. Cyclopropane or gas-and-oxygen is the anaesthetic of choice.

Technique.—The fracture is reduced by the Whitman manœuvre, and the feet are attached to the foot-pieces of an orthopaedic table by plaster-of-Paris. This step is essential to ensure stability for radiography. To depend on the human factor in holding the limb is giving a hostage to fortune, and one should not rely on fortune in a surgical operation. A Michel clip is placed over the head of the femur and another over the lowest limit of the fracture. These are verified by radiography, and a point two inches below the lower clip is chosen. A calibrated guide (the Hey Groves measure may be used instead of the calibrated guide if preferred) is passed anterior to the shaft and neck of the femur over this point. It will therefore enter the skin an inch distal to this. It is passed in the direction of the femoral head, and its angle to the horizontal is noted, the latter being a constant. A 4-inch incision is made and the lateral surface of the femur exposed. With a one-third-inch gouge a longitudinal furrow is made in the long axis of the femur, starting at the trochanteric end. This is done to prevent splintering, and, as the gouge is directed away from the fracture, splintering up into it cannot occur. The furrow should be one and a half inches long and just wide enough to admit the flanges of the nail but not the head. A Watson-Jones guide is now inserted into the bone and its position checked by antero-posterior and lateral radiographs. The gaping of the incision may have distorted the lateral position of the calibrated guide, hence the importance of noting the angle to the horizontal. If the radiographs show a satisfactory position the nail is inserted in the usual way, a 12 to 15 cm. one being used.

After-treatment.—The patient does active quadriceps exercises and knee movements from the second day. The sutures are removed on the tenth day and the patient is allowed up on crutches after three to four weeks. If the position of the nail is satisfactory, weight-bearing may be permitted after six weeks. The weight-bearing calliper which protects the entire limb below the fracture and throws a torsion strain on the fracture is vetoed.

Possible Criticisms

1. *Splintering.*—This is met by making the longitudinal furrow from above downwards. Occasionally slight splintering may occur. Even so, the nail will usually hold the fracture adequately.

2. *Fracture of Shaft below Site of Insertion of Nail.*—This has occurred in two patients, in each due to a fall. Both subsequent fractures united uneventfully.

3. *Recurrence of Deformity.*—External rotation will not occur, as the angle of the pin to the perpendicular is more vertical than that of the neck to the shaft, and consequently the nail cannot rotate. Adduction has occurred in three patients. This was due to the nail not being inserted far enough—a purely technical error.

4. It may be said that there is an area of pulping in the region of the great trochanter which will not hold the nail. This may occur, but if the nail has a hold of two inches in the upper fragment and two inches in the lower fragment, this should be enough to keep the area stable. In these patients, of course, early weight-bearing should not be permitted.

I had hoped to publish with this paper a complete summary of results, but a change in my status has rendered this impossible. In the two years before July, 1941, between 40 and 50 patients with trochanteric fractures were nailed, with good results in over 75%. It is admitted that this is an inadequate statistical statement.

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Dr. Adolf Meyer, who retired on Sept. 1 last from the Henry Phipps chair of psychiatry and the directorship of the Psychiatric Clinic of the Johns Hopkins Hospital, has been succeeded by Dr. John C. Whitehorn, since 1938 professor of psychiatry at the Medical School of Washington University, St. Louis.

A NEW METHOD OF CONTROLLING THE HEAD LOUSE

BY

J. R. BUSVINE and P. A. BUXTON

Department of Entomology, London School of Hygiene and Tropical Medicine

Mellanby (1941) has called attention to the high incidence of head lice, especially in girls, in large cities in England. Those who have had experience with children evacuated from cities or with young women in industry confirm his conclusions. Figures at our disposal accumulated at medical inspections indicate that in industrial areas in Britain the incidence in young women is about 30 to 50%.

The Problem

An essential point in the problem of control is that if the person lives among others who are infested it is of little use to cleanse the head, for it quickly becomes reinfested. Evidently what is needed is an insecticide which shall remain effective in the hair for as long as possible, so as to "proof" the individual; with such an insecticide one would have some hope of eliminating the insect from a large section of the community. If, on the other hand, a lousy person is admitted into clean surroundings (e.g., hospital or military service), all that is wanted is something that will destroy lice and also nits with certainty.

In treating a head it should be remembered that nearly all the unhatched eggs are close to the scalp, and that the lice must go to the skin for food. The insecticide must therefore cover the whole hairy scalp, but there is no need to saturate the hair at a distance from the head. In order to avoid an unpleasant appearance the volume of insecticide should be small.

Most of the substances commonly employed, such as paraffin, cresol solutions, sassafras, and alcohol, are volatile and therefore have no protective power. Moreover, it is doubtful whether they kill nits; and some of them, particularly paraffin, make the hair sticky and arouse opposition. As an admission of the ineffectiveness of these materials it is often recommended that after application the infested hair should be cut short or combed with a fine steel comb. We have ourselves recently tested both paraffin (kerosene) and phenol (1:40) on women on whom lice as well as eggs were found. In each case a bathing-cap was worn for one hour after application. The results were as follows:

	No. of Cases	Failures (i.e., Living Lice or Nits)
Paraffin	12	10 (83·3%)
Phenol	9	7 (77·7%)

An Improved Method

We find that the following insecticides have great advantages over any others with which we are acquainted: (1) 25% technical lauryl thiocyanate in a white oil; (2) 50% lethane 384 special, in similar oil; (3) derris cream. (For specifications of these substances see below.) For any of these three the dose is 0.5 to 2 drachms (about 2 to 8 c.cm.) a head, the lowest dose sufficing for a child with short hair, the highest for a woman with long thick hair. The volume recommended is approximately that which people who apply brilliantine or hair oil generally use, so that the result is not unsightly, except on very fuzzy or very fair hair.

In applying these materials the hair should be parted by one hand and the liquid or cream put on the scalp itself with a teaspoon or pipette held in the other hand. This should be done on eight spots, four on each side; the material is then distributed by massaging with the fingers. It should not be distributed by combing, for that tends to draw the insecticide away from the scalp. The patient is instructed not to wash the head for ten days.

Advantages of the Method

1. The practical experiments are summarized in Table I. Some of the work was done by several different lady medical officers (R.A.M.C.) working in depots which admit girls into

one of the uniformed Government Services. These ladies, whose careful help we acknowledge, did not know what drug they were using or in what concentration, so that their results are unprejudiced. On the other hand, they had many other things to do, and we think that some of their results are open to question, one difficulty being the recognition of live unhatched nits.

TABLE I.—*Results of Trials of Head-Louse Insecticides*

Experimental Subjects	Insecticide	No. of Cases	Failures (%)
Recruits to Service "A" ..	25% lauryl thiocyanate	55	1·8
*Mediterranean evacuees ..	" " "	45	8·9
*Recruits to Service "B" ..	" " "	51	7·8
* " " " " ..	10% " "	18	39·0
* " " " " ..	4% " "	20	60·0
" " " "A" ..	50% lethane special	26	7·8
*Mediterranean evacuees ..	" "	13	15·4
* " " ..	Derris cream (1% rotenone)	12	8·3
Recruits to Service "A" ..	" " "	35	0
" " " " ..	Thin derris cream (1% rotenone)	187	1·1
" " " " ..	Thin derris cream (0·5% rotenone)	84	7·1

* These observations were made either by one of us, or by Miss I. Ledingham or Mr. A. C. Harvey, working for us. We know that the head was actually infested at the time the drug was put on (and many were specially chosen, as being very verminous), and a long and careful search on several days, up to the tenth, was made subsequently for live nits. For these reasons the results marked by asterisks are the most reliable.

Table I shows that the three drugs, in the proportions recommended, are highly successful; failures *on those going into a clean environment* being generally under 2% and always under 10%. It also shows that if the concentrations of drug are reduced a considerable proportion of failures occur. The word "failure" is to be understood as meaning "incomplete kill," and if even only one live louse or egg is found up to the tenth day the case is recorded as a failure.

2. We know from laboratory experiments that all these three materials (in the dose and concentration stated above) remain effective on the hair for 8 to 9 days, provided the head is not washed; this is easily shown by taking hair clippings from a treated head at intervals, and putting lice to live on them in a rearing-box. The loss of activity after 8 or 9 days is believed to be due to insecticide rubbing off on the pillow, not to chemical change. The fact that with a single application one can "proof" a head for a period is likely to be of great value in civil life. Moreover, if the drug is not efficiently applied and a few eggs escape, the larvae hatching from them will almost certainly be killed as they move about the scalp.

3. Another advantage of these drugs is that small volumes are used, so that the hair does not appear to be very oily or greasy. We suggest that the thiocyanates might be introduced to the public as "medicated hair oil," and the derris cream as "medicated hair cream." We believe that under such names they would be very acceptable. Moreover, doctors and nurses (some of whom have had long experience of combing, oiling, and hair-clipping) comment favourably on the ease and convenience of the method. Several of the doctors who helped with the experiments have written and asked for further supplies and have passed the information to their friends.

The cost of the drugs is very low. A recent retail quotation for lethane special was 35s. per imperial gallon. This is enough for 2,200 heads, at a cost of under one-fifth of a penny a head. The cost of lauryl thiocyanate is rather higher. We have no information of the cost of the derris cream.

Objections and Disadvantages

1. The two thiocyanates (and to some extent the derris cream) have slight but disagreeable odours, easily masked by the addition of 2% of oil of citronella or oil of bay, etc. We have, however, often used them on our own heads without essential oils and without arousing comment from our colleagues or families.

2. The question of possible danger to man has been carefully gone into. It is certainly true that thiocyanates and emulsions containing rotenone may under certain circumstances cause dermatitis if applied to the bare skin of some individuals. In head application most of the drug is taken up by the hair, so that the dose actually on the skin is small and, in our experience, harmless. For a full study of the toxicity of these thiocyanates to mammals see Cameron, Doniger, and Hughes (1939). We admit that we use a considerably higher concentration (25%) than these authors regard as safe, mainly in order to prolong the period during which the drug remains effective in the hair. After preliminary experiments on ourselves and our colleagues we have applied this concentration to about 200 heads without any ill effects or discomfort. As to our derris cream, we have applied it in all to 250 heads and patch-tested it on the arms of 90 volunteers, and seen no symptoms of any sort. Prof. G. R. Cameron has been so good as to test it by putting very large quantities on the hair of rabbits and goats: he reports that a month later the animals were in good health. Emulsions of rotenone, or other substances derived from derris, may cause dermatitis, especially on the skin of the scrotum, and we do not recommend the derris cream or the thiocyanates for that part of the body. It is probable that there may be individuals (we have found none) who are particularly sensitive to one or other of these drugs, even if correctly applied to the scalp, just as others are intolerant of quinine, aspirin, etc.

3. We recommend that the head should not be washed for 7 to 10 days, and exception has been taken to this on the ground that one ought to emphasize the importance of cleanliness. None the less, in our experience it is better to leave the head unwashed for this period, probably because of the difficulty of ensuring that all parts of the scalp are treated. The alternative is to use a larger bulk of insecticide, which can be relied on to touch all parts but which looks very oily and unpleasant. With the derris cream it is probably even more important not to wash it off, because its effect on the louse is slow and because it probably does not kill nits.

A Field Experiment

One particular experiment, of which the facts are given in Table I, is worth fuller description, because the conditions were so difficult. There are certain hostels in London full of refugees from a Mediterranean country. The children and the mothers are heavily infested with head lice, and appear to regard these parasites as normal. The mothers refuse to be touched, and the nurses have been cleaning up the children's heads for many months without making any lasting impression. Miss I. Ledingham was good enough to give up nearly two months to treating these children and following them up. The work was rendered especially difficult by the lack of co-operation from the children's parents. Many washed off the insecticide at once and others prevented the children going for reinspection; indeed, one mother was actually caught reinfesting her child's head with fresh lice "for good luck." For all these reasons it was possible to follow up only a portion of the hundred-odd cases treated; the results available are set out in Table II. Considering the great possibilities of rapid reinfestation, these figures are very satisfactory.

TABLE II.—*Reinfestation after Treatment (Mediterranean Evacuees)*

Insecticide	Failures at Different Periods after Treatment (%)			
	3–7 Days	10–14 Days	16–22 Days	25–32 Days
25% lauryl thiocyanate in white oil	4·4 (68)	8·9 (45)	25·8 (31)	33·3 (15)
10% " " "	0 (19)	37·5 (13)	—	—

Figures in brackets are the number of cases inspected in different periods.

Specifications

The specifications of the above drugs are as follows:

Lauryl Thiocyanate (dodecyl thiocyanate; lauryl rhodanate).—This substance is made only by Messrs. du Pont de Nemours at Wilmington, Delaware, U.S.A., and is obtainable in Britain through Imperial Chemical Industries, Ltd. The quality available is "technical," and is marketed in America as "lorol rhodanate." This technical grade contains 60% lauryl thiocyanate and 40% of certain homologues, some of which would be harmful to man if considerable proportions were present. This risk is greatly reduced by specifying that the thiocyanate was manufactured from lauryl alcohol which began to distil at or above 236° C. (atmospheric pressure) and of which 95% distilled below 319° C. The white oil which we have used as a diluent is a high-boiling paraffin (I.B.P. 325° C.), with a very low aromatic content, sold by the Shell Company as P31. We have reason for thinking that any refined oil of this type would be suitable.

Lethane 384 Special (12.5% N-butyl carbitol thiocyanate; 37.5% beta-thiocyanoethyl laufate; 50% refined paraffin).—Produced by Messrs. Rohm and Haas of Philadelphia, U.S.A., and obtainable in Britain through Messrs. C. Lennig, Windsor House, Victoria Street, London, S.W.1. It is to be noted that the material is sold in 50% dilution. We dilute it a further 50%, giving a final 25% concentration of the effective drugs. We have used the same oil as already mentioned.

Derris Cream.—This is made up for us by Messrs. Cooper, McDougall and Robertson of Berkhamsted. The cream we have used has been a solution of derris extract in castor oil, the whole emulsified suitably to make a cream containing 1% of rotenone and 7% of derris extract. In our samples the emulsifying agent was lanette wax, but there are other similar materials which might be equally effective.

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Medical Memoranda

Epidemic Catarrhal Jaundice

Epidemics of catarrhal jaundice are by no means infrequent. In Price's *Text Book of Medicine* reference is made to outbreaks occurring in the West Riding of Yorkshire in 1930 and 1935. It is of interest to record a minor local outbreak in the same county in September and October, 1941. Twelve cases have been reported, including two that were only suspect (5 male and 7 female). Nine of them were between 2 and 16 years of age, one was 24, and two were in the forties.

One case dates back to September 15, two to September 30, eight started during the period October 2 to 13, and one did not begin until October 22. Three began with influenzal symptoms—i.e., feeling chilly and as if they had a rise of temperature—and nine, including the two suspects, began with gastric symptoms. Two cases occurred in each of two families, and one suspect, a child aged 2, shared a bed with his aunt, aged 13, who was affected. Of the nine different families concerned, five were at the same end of the town.

Possible Modes of Spread.—The recognized modes are by the enteric route and by the nasopharyngeal route (droplet infection). In this series the nine different families obtained their milk from eight different milkmen, all producer-retailers in a small way. Some took all their meals at home, others dined at canteens; some included in their dietary those articles of food so often suspect—pies and sausages; others indignantly denied eating made-up foods. In short, there was no uniformity in school, place of worship, place of employment, milk supply, or diet. In favour of the disease being spread by "droplet infection" are: the occurrence of two cases in the same family on two occasions, a suspect and an actual case in relatives in another, and two girls from different families who had been playmates both contracting the complaint; in two other cases the parents stated that playmates had had jaundice, though these further cases did not come under medical care and were not investigated; and, perhaps the most interesting point of all, the very last case in the series was that of a rent collector who stated that in the course of his work he had been into several houses where cases of jaundice had recently occurred.

Recovery in all cases was uneventful, and opportunity for carrying out tests for hepatic efficiency did not arise. An unsuccessful attempt was made to obtain supplies of sulphaguanidine for clinical trial. In so far as any conclusion can be drawn from such a small series of cases, the balance of the evidence is in favour of "droplet infection" as the mode of spread.

My thanks are due to local practitioners for voluntarily notifying the above cases.

C. GRANT NICOL, M.B., B.S., D.P.H.,
M.O.H., Mirfield, Yorkshire.

Dr. Ralph I. Lloyd became president of the American Academy of Ophthalmology and Otolaryngology on January 1, and Dr. James A. Babbitt, emeritus professor of clinical otolaryngology in the University of Pennsylvania, took office as president-elect.

Reviews

MUIR'S PATHOLOGY

Textbook of Pathology. By Sir Robert Muir, M.A., M.D., Sc.D., LL.D., F.R.S. Fifth edition. (Pp. 991; illustrated. 35s. net.) London: Edward Arnold and Co. 1941.

The fifth edition of Sir Robert Muir's classical *Textbook of Pathology* closely resembles its predecessor in content and arrangement, as well as in excellence of production. There are nevertheless numerous changes in the text incorporating advances in knowledge during the past five years. Among new subjects introduced are the study of experimental hypertension by Goldblatt and his followers, and regional ileitis; there are descriptions of two new tumours, glomangioma and adenolymphoma; and melanoma has been taken out of the section on sarcoma and placed in a separate category. The description of teratomata has been rewritten, with a reference to the bearing on this subject of Needham's work on organizers. The aetiology of cancer is dealt with more fully and incorporates a description of recent work on the hereditary factor in man and that of Bittner (whose name and Masugi's in the chapter on nephritis are misspelt) on the mode of transmission of susceptibility to breast cancer in mice. The description of Bright's disease has also been extensively rearranged and rewritten. Condensation elsewhere has so balanced these additions that the present volume is actually three pages shorter, in spite of containing twenty-eight more illustrations than the fourth edition.

It is a great achievement again to have brought this pre-eminent work fully abreast of recently acquired knowledge. Its great virtues are reliability as to fact, and authority of judgment in matters of controversy: for either the student or the more senior seeker after knowledge there is no sounder guide.

ABDOMINAL SURGERY

Operative Surgery: Including Anesthesia, Pre- and Post-operative Treatment, Principles of Surgical Technic, Blood Transfusion, and Abdominal Surgery. Edited by Frederic W. Bancroft, M.D., F.A.C.S. (Pp. 1,102; illustrated. 55s. net.) New York and London: D. Appleton-Century Company, Inc. 1941.

The rather long title of this book on operative surgery of the abdomen has at least the advantage of outlining the field it covers; presumably other volumes are to follow on other branches of operative surgery. The chief appeal of the present volume will be to the so-called (and sometimes maligned) general surgeon, a term rapidly coming to mean the abdominal surgeon who also maintains his interest in the science and art of surgery considered as a whole. True, the general surgeon may have particular interests or surgical hobbies outside the abdomen, but there his chief work lies, and for him this is an excellent modern guide-book. Under the editorship of the associate professor of clinical surgery in Columbia University, thirty-four authors have combined to produce it, and these include such well-known names as Alton Ochsner, who writes on appendicitis; Urban Maes, on the spleen; Mont. A. Reid, on surgical technique; F. W. Rankin, on the large bowel; Alfred Blalock on pre- and post-operative treatment; Rudolf Schindler, on gastroscopy; and A. O. Whipple, on the surgery of the biliary tract.

The book is divided into twenty sections, each consisting of several chapters, printed in attractive clear type and well illustrated by photographs and line drawings and with several coloured plates. Some idea of the scope of each section may be gathered from the introductory one on anaesthesia, which includes chapters on pre-anaesthetic medication, inhalational, rectal, intravenous, spinal, and regional anaesthesia, each written by a different author.

Such subjects as shock and hypoproteinaemia are discussed clearly and simply in articles in the second section. Blood transfusion has a section to itself. Here we find an interesting historical introduction followed by articles on the preservation of blood, blood substitutes, and on complications following transfusion, as well as an account of the methods of carrying this out. Other sections include a consideration of abdominal incisions, of jejunal ulcer, and of the surgery of the mouth and oesophagus; but enough has been said to indicate the extent of the field covered. With regard to the method of covering it we have only to say that certain of the articles are the best of their kind that we have read; all are essentially modern and of a practical character; and, while there is—as there must be in all composite works—some variation in style and quality, the whole can be described as of a particularly high standard. The subject-matter, as the editor indicates in his preface, is entirely concerned with surgical treatment and not with aetiology, pathology, or diagnosis; presumably the diagnosis is made before this work is consulted, but differential diagnosis is considered in relation to the type of treatment to be followed. Indications for operation, contraindications, dangers, and complications, are stressed along with prognosis.

We have sketched the general purpose of the book; as a sample of its contents and incidentally of some of the excellent advice it gives we may quote from an article on theatre technique on page 243: "Talking through a mask over an open wound is bad enough when the subject pertains to the patient, but to do it for entertainment is sheer malpractice." The essentially sound and practical character of this work, together with its attractive appearance and comprehensive range, makes it a textbook of operative abdominal surgery which bids fair to become a standard work.

THE PSYCHOSOMATIC CONCEPTION OF DISEASE

Disease and the Social System. By Arthur Guirdham, M.A., D.M. (Pp. 239. 10s. 6d. net.) London: George Allen and Unwin, Ltd. 1942.

"Preventive medicine must search the brittle fabric of man's personality. Till then it will be no more than a pretentious handmaid of sanitation." These words strike the dominant note in Dr. Guirdham's book, which typifies the recent increased perception by medicine of its social responsibilities. The author tells us he aims at being suggestive rather than dogmatic. Suggestive he certainly is, but surely a dogmatic note is to be heard in such phrases as, "Pasteur retarded the progress of medicine by a hundred years"; some surgery "is blind carpentry performed by persons of inadequate culture"; "in twenty years' time psycho-analysis as now practised will be dead." Such violent language, combined with a literary style sometimes reminiscent of Mr. Alfred Jingle, may deter the reader from the study of a book which really contains much of interest. Chronic constitutional disorders such as peptic ulcer, arteriosclerosis, thyrotoxicosis, and diabetes he regards as "strain diseases," and he reminds us that fear will produce similar reactions. This leads him to discuss the emotional causes of physical disease and to the conclusion that, whether the disease reaction is physical or only quasi-physical, it will express itself through the vulnerable organ, herein approximating to the doctrine of Adler. The emotions express themselves through the autonomic nervous system, which in turn is closely interrelated with the endocrine system. "We should conceive of disease as a disharmony arising in the psyche." Rest and purposeful relaxation are valuable therapeutic agents. "Games are too competitive. They are a masquerade of work. . . . Cricket is depressingly associated with the moral order." Widening his canvas, the author goes on to apply his conclusions to social pathology and the spiritual factors in disease, with much, but by no means all, of which we are in agreement. He certainly has some shrewd observations to make. In the final section medical training and organization come in for severe criticism under the caption "The Comedy of Errors."

This contribution to the psychosomatic conception of disease would, we think, carry more weight if there were less repetition and less of a scolding note of superiority. We feel that Dr. Guirdham with his enthusiasm has it in him to write a better book.

OPHTHALMOLOGY

A Handbook of Ophthalmology. By Humphrey Neame, F.R.C.S., and F. A. Williamson-Noble, F.R.C.S. Fourth edition. (Pp. 320; illustrated. 18s.) London: J. and A. Churchill, Ltd. 1942.

The present edition is largely a reprint of the third edition published in 1939. As the book is now deservedly well established with students, greater care in the revision is a duty the authors must shoulder. They have done well in substituting "retinopathy" for "retinitis" throughout the text and giving an up-to-date account of the pathogenesis of glaucoma. The chapter on tropical ophthalmology contributed by Colonel Williamson has been rewritten rather too fully to fit into the general plan of the book: the student is not really concerned with the minutiae of the several varieties of intracapsular extraction of cataract or the "four-needles" operation for staphyloma of the cornea. There is need for fuller consideration of the sulphonamides in various ocular infections: they are mentioned in a footnote in the section on the treatment of ophthalmia neonatorum and ignored altogether in the treatment of trachoma, iritis, and blepharitis. The value of vitamin B_2 in corneal lesions is also ignored. In fact the considerable advances in ophthalmic therapeutics during the past fifteen years are not well reflected. It is rather incongruous to find full descriptions of two operations for ptosis and accounts of such procedures as the "three snip operation" when a bare paragraph is devoted to retinal detachment. In an excellent and well-balanced treatise such as this book is these are faults that should be eliminated in the next edition.

Notes on Books

The prompt appearance of the *1941 Year Book of Pediatrics* (H. K. Lewis and Co., 16s. 6d.), so ably edited by Prof. ISAAC ABT and Dr. A. F. ABT, with its nearly four hundred annotations from the literature, is a welcome event, and in virtue of the large number of citations from British journals speaks well for the sustained energies of paediatricians during a difficult period. It should be noted—and it is one of the particularly valuable features of this work—that its contents are culled not only from the world paediatric literature (so far as available), but also from the general medical publications. In fact items from non-paediatric sources exceed those from the special journals by more than two to one. Diagnosis and treatment always receive particular attention, and, as usual, the editorial comments on new procedures are pungent and precise. The illustrations and general quality of production are of a high standard, and indeed appear even better than ever, probably because the paper is so much superior to that now used in books on our side of the Atlantic. Dr. Abt's yearly contribution to the friendly collaboration (on paper) of paediatricians on the two sides of this ocean is especially welcome now that so much else binds them together. It is important that the coming generation of the English-speaking world should have all the benefit which interchange of ideas must achieve.

The *Dentists Register* for 1942 has now been published by the Dental Board of the United Kingdom by Constable and Co., price 12s., post free 12s. 9d. The total number of names appearing on January 1 of this year is 15,096, being 64 more than the figure for 1941. All the new entries added during the year were of persons registered as graduates or licentiates.

BRITISH MEDICAL JOURNAL
LONDON
SATURDAY APRIL 11 1942

OXYGEN THERAPY IN SURGERY

Soon after the discovery of oxygen by Scheele, Priestley, and Lavoisier in the eighteenth century physicians paid great attention to it and indulged in many hypotheses about the part it might play as a cause of and cure for a variety of diseases. The most noteworthy of these physicians was Thomas Beddoes (1706-1808) of Shifnall, Shropshire, and his publication, "Considerations on the Medical Use and on the Production of Factitious Airs," might be called the introduction to inhalation therapy. He established the Pneumatic Laboratory at Bristol with the idea of discovering some part of the effect of oxygen and other gases upon the animal economy. His assistants included James Watt, the inventor of the steam engine, and Sir Humphry Davy, the discoverer of the anaesthetic properties of nitrous oxide or laughing gas. Beddoes, however, failed to establish the beneficial value of oxygen, and at his death was greatly depressed at the apparent failure of all his endeavours.[1] This was a great misfortune, for there is now no doubt of the high value of oxygen therapy. Dr. Herbert C. Chase[2] of New York has lately reviewed the position as regards one field only—namely, that of surgery. He states that in the surgical patient anoxia is by far the biggest single hazard, and oxygen therapy certainly lowers the mortality and much decreases morbidity. The prevention of anoxia is of prime importance, and not to the anaesthetist only. Oxygen therapy should be carried out in all indicated cases as soon as the patient is admitted, and be continued up to the time of anaesthesia, throughout this period, and in higher percentage during post-operative recovery. Only too often the anaesthetist is presented with a patient already anoxic and in a state of acidosis or alkalosis, or having a reduced blood volume and in a state of stagnant anoxia. At other times he is presented with a patient with anaemic anoxia, or this type combined with an added histotoxic anoxia from one of the sulphonamide drugs. Thus the negligent surgeon may add to the hazard of the patient and the difficulty of the anaesthetist.

The position as the anaesthetist sees it has been clearly stated by Drs. R. M. Water, A. J. Wineland, and M. H. Seevers.[3] They group the causes of anoxia particularly pertinent to the anaesthetist as follows: a high basal metabolic rate due to fever, fear, toxaemia, and pain; a reduced pulmonary alveolar surface due to disease or mechanical compression from position; poor oxygen-carrying power of the blood; cardiac insufficiency; obstruction of the respiration due to oedema, inhaled mucus, fluid, or vomit, or to laryngospasm; defects in anaesthetic apparatus; faulty anaesthetic technique; respiratory depression; deep anaesthesia; high spinal block: and central depression from morphine sulphate or barbiturates. Drs. G. E. Burford and H. Leigh[4] emphasize that in the patient under spinal anaesthesia it is very necessary to maintain an ample supply of oxygen and a high alveolar oxygen tension from the beginning to the end of anaesthesia and for six to eight hours thereafter. The nausea and vomiting of spinal anaesthesia are due to anoxia. The use of 100% oxygen over a period of from 24 to 36 hours post-operatively prevents "spinal headache" in nearly every instance. In general anaesthesia the rise in rate of respiration, the steady rise of blood pressure, and the appearance of the Brace syndrome—increased pulse rate and variations in the volume of the individual beats—indicate anoxia and must be promptly corrected.

As regards abdominal surgery, Dr. W. S. Lemon[5] finds that 1 of every 50 patients operated upon for abdominal lesions develops some form of pulmonary complication and 1 of every 185 dies from it. The highest incidence is in upper abdominal operations and in cases in which tight strapping, pain, splinting of the diaphragm, or morphine and sedatives have contributed to hypoventilation. It is in these cases in which the use of oxygen during anaesthesia and early in the post-operative period has much reduced both the incidence of anoxia and the mortality. Again, the value of oxygen therapy in post-operative abdominal distension, ileus, and intestinal obstruction has now become established. The reason is that the breathing of pure oxygen removes nitrogen from the lungs, from the blood, and from the lumen of the intestine, where, in distension, the major part of the gas is nitrogen. When oxygen is breathed nitrogen diffuses outwards and oxygen diffuses inwards, but as oxygen is used up by the tissues its volume is much less than that of the nitrogen it replaces. Animal experiment has proved that breathing oxygen removes nitrogen from the blood[6] or from a loop of the intestine,[7] or injected nitrogen from the peritoneal cavity.[8] It has also been proved[9] that the nitrogen is at least in part replaced by some of the respired oxygen. Fine and his colleagues[10] showed by clinical trial that post-operative distension and the distension of intestinal obstruction were diminished from 60 to 70% in twenty-four hours by the inhalation of 95% of oxygen. Another surgical condition in which oxygen is a great sedative is post-operative thyrotoxicosis. Dr. Chase states that the high basal rate, the rapid pulse, the hyperthermia, all demand oxygen in large volume. The air hunger, the restlessness, the burning fever, the fright, and the fear are relieved as by magic. Drs. S. F. Haines and W. M. Boothby[11] have found that after thyroidectomy about 2% of the patients develop tracheal and laryngeal oedema, pulmonary oedema, bronchopneumonia, or cardiac insufficiency. With oxygen administered at 100% there is a rapid crisis-like drop in the temperature: decrease in pulse rate and general improvement occur with subsidence or limitation of the process.

It will be noted that oxygen is now recommended in the form of the pure gas. Inhalation of this for 24 to 36 hours at a time is held to be harmless in patients with anoxia. It is possible that Beddoes and Chaussier used pure oxygen over 150 years ago. Drs. J. H. Evans and C. J. Durshordwe[12] in 1932 advocated 100% oxygen for patients with pneumonia, and many others are now using the pure gas for limited periods. The solution of the problem of oxygen therapy seems to be a cheap and bountiful supply of the pure gas. Dr. Boothby[13] and his colleagues have recently introduced the so-called B.L.B. mask, which requires a flow of 8 to 10 litres a minute to give nearly 100% oxygen in the lung alveoli. It is not generally known that with such a high rate of oxygen flow several other masks will also give

1 See review by Campbell and Poulton in *Oxygen and Carbon Dioxide Therapy*, 2nd edition, 1938. London: Oxford University Press.
2 *Surg. Gynec. Obstet.*, 1941, **73**, No. 2, Internat. Abst. Surg., p. 105.
3 *Anesth. and Analges.*, 1931, **10**, 10.
4 Ibid., 1939, **18**, 312.
5 *The Stomach and Duodenum*, by Eusterman, G. B., and Balfour, D. C., 1935. Philadelphia: W. B. Saunders Company.
6 Fine, J., Frehling, S., and Starr, A. J., *J. thorac. Surg.*, 1935, **4**, 635.
7 McIver, M. A., Redfield, A. C., and Benedict, E. B., *Amer. J. Physiol.*, 1926, **76**, 92.
8 Campbell, J. Argyll, *J. Physiol.*, 1927, **62**, 213.
9 Idem, ibid., 1930, **68**, vii, P.
10 *Ann. Surg.*, 1938, **107**, 1.
11 *Amer. J. Surg.*, 1929, n.s. **6**, 1.
12 *Anesth. and Analges.*, 1932, **11**, 193.
13 *Proc. Mayo Clin.*, 1938, **13**, 641.

similar high oxygen percentages in the lung alveoli. Indeed, in an emergency an ordinary cardboard box of 1 litre capacity placed over the nose and mouth and with the edges covered loosely with a piece of lint to hinder entrance of air and to reduce the rate of flow of oxygen from under the box will do quite well.[14] With 10 litres of oxygen a minute entering the box by a rubber tube, the interior of the box is ventilated by the oxygen itself, which is free to pass out under the lint. There is always danger from fire and explosion with the use of pure oxygen, and this risk is greater with the oxygen tent or chamber than with the mask or catheter. Whichever method is used, it is advisable to reduce the percentage of oxygen breathed by the patient as soon as possible after recovery from the anoxia, because there is definite evidence of pathological changes in some normal subjects after breathing pure oxygen for 24 hours, and even after only 5 to 6 hours. Dr. Waters[15] warns that oxygen administration may mask the real cause of oxygen deficiency in a patient; this should be sought for and, if possible, corrected immediately.

ARTHRODESIS

Although fixation of a joint—arthrodesis—is essentially a destructive operation it is one of the most valuable in orthopaedic surgery, and when properly employed gives very gratifying results. A surgeon performing the operation must know three things: the pathology of the condition under consideration, the time at which he may safely intervene (it is rarely justifiable in childhood), and the technical steps necessary to secure sound fusion in a satisfactory position. It is with the last that Mr. H. A. Brittain is chiefly concerned in his recent monograph *Architectural Principles in Arthrodesis*[16]; and there is no doubt that guidance in technique is needed, for far too many arthrodeses fail because of bad mechanics and faulty craftsmanship. A surgeon, unlike an architect, has to be his own carpenter, and both are at fault if the carpentry used in their work is not of a high order. Mr. Brittain deals only with operations in which bone grafts are used, though it is to be noted that he employs grafts in many situations, the knee for example, where others are content with a simple excision of the joint surfaces. As a result of his study of architectural principles, which he illustrates in an engagingly simple fashion, he has arrived at four rules which should guide the surgeon: (1) The graft should be placed with its long axis in compression rather than in tension; (2) the breadth of the graft should be placed in the position of maximum stress; (3) a joint should be locked by two grafts crossing each other in the shape of the letter X; (4) there should be adequate protection of the graft.

There is no doubt that these rules are sound. Their application, too, is logical, and the operations on the hip, shoulder, and knee are particularly attractive. Arthrodesis of the hip is performed by subtrochanteric osteotomy and the insertion of a graft into the ischium, the free end of the graft lying between the proximal and distal segments of the femur. When the operation is successful, fusion occurs between ischium and femur, and in some cases hypertrophy of the grafted bone is so remarkable that there is no doubt that the chief aim of the operation is achieved—namely, the transference of weight-bearing from the head of the femur to the ischio-femoral bridge, and this is an important consideration in imperfectly healed tuberculous disease. But the operation is not so simple as its author suggests. The insertion of the graft has to be done blind, and it is not easy to get it into the right part of the ischium, and it is also possible for contact to be lost between the outer end of the graft and the femur. In this respect the comparable operation on the shoulder is more sound, for the graft is placed between the humerus and the infraglenoid margin of the scapula under direct vision, and there is little risk of displacement: as Mr. Brittain points out, the great charm of this operation (which was suggested to him by his colleague, Mr. G. K. McKee) is that once the graft is home the weight of the upper extremity locks it in position. The cross-grafting operation for producing fusion of the knee is well worth the considerable technical difficulties that attend it (here again they are greater than the author suggests); for the fusion that results consolidates more rapidly than that after simple excision. If the technique is correct then the internal splinting produced by the cross-grafts is so very nearly perfect that the post-operative plaster fixation is robbed of most of its alarms.

Except in the case of the hip no statistics of results are given—which is a little unfortunate in a monograph so lavishly produced. We are prepared to believe that the results of arthrodesis performed by one or other of Mr. Brittain's methods are, in fact, superior to those obtained after simpler (and often mechanically less sound) procedures; there are *a priori* reasons for accepting Mr. Brittain's claims. But in medicine so few things can be established by inductive reasoning alone, and Mr. Brittain would have been a little more convincing had he completed his task by producing results in each series of cases.

THE PRESENT CHOICE OF DISINFECTANTS

It was made known some time ago that there is a shortage of phenol for medical purposes owing to a war time demand for its diversion to quite different uses. The same is now true of certain cresols. It follows that the use of phenol and lysol as disinfectants must be severely curtailed and substitutes must therefore be found. Both in view of this new position and because practice in this matter has been very varied and often wasteful, a Memorandum on Economy in the Use of Bactericides which is being circulated by the Therapeutic Requirements Committee of the Medical Research Council deserves careful attention.[1] It deals only with the disinfection of utensils and materials, and not at all with the use of chemicals as antiseptics on the body, a matter into which other considerations enter. Availability and efficiency are the main things to be considered, while the price factor must also be recognized: for instance, whereas products of the dettol type are well suited for skin sterilization, it is grossly wasteful to use them for such coarse purposes as the disinfection of floors and excreta. There are two main classes of disinfectants available in adequate amount, if properly used, to take the place of phenol and cresols, and capable of doing the same work. Chlorinated lime is suitable for various coarse purposes, not all directly medical, and is cheap and readily available. For dangerous excreta, bedpans, floors, and many other purposes disinfectants containing coal-tar derivatives other than phenol and cresol are suitable. These are so-called "white" and "black" fluids, forming emulsions on dilution and sold under many proprietary names. Since they vary in efficiency no general instructions can be given for their use, but some indication of the strengths necessary is given in this memorandum on the assumption that the fluid chosen has a Chick-Martin coefficient of not less than 3.0. Thus, for example, 1 oz. of a good "white fluid" to a pail of water can be used for disinfecting linen, but at least four times this strength should be used for treating

[1] See page 476.

[14] Campbell, J. Argyll, *Lancet*, 1937, **1**, 82.
[15] *J. Amer. med Ass.*, 1940, **115**, 1687.
[16] Edinburgh: E. and S. Livingstone. (21s.)

excreta. It is emphasized that mechanical cleansing should precede chemical treatment if this is to be both successful and economical, and that heat is preferable to chemical treatment whenever possible. It was strongly urged in the M.R.C. War Memorandum No. 6 on the prevention of hospital infection of wounds that more and larger sterilizers should be available in which surgical utensils can be boiled. Such things as arm baths, if they cannot be boiled, need to be rubbed over with strong lysol, as chemical disinfection is impracticable unless the reagent used has also a solvent and cleansing action. For the same reason there seems unfortunately to be no alternative to lysol for full-size baths used for septic cases: this is indeed almost the only unavoidable indication for lysol left. It is pointed out that rubber sheeting, though often religiously disinfected after every item of use, is often not dangerously contaminated and need only be washed. These recommendations cover briefly some of the most important medical uses of disinfectants, and putting them into effect should be regarded as an imperative obligation in the national interest. In order that adequate supplies of " white " and " black " fluids shall continue to be available for these genuine and essential uses it is to be hoped that other and larger users may review their practice and restrict their consumption to rational and necessary purposes. Thousands of gallons of such fluids are slopped about without due calculation of effect, and sometimes with no effect and even no purpose other than to serve as deodorants or to discourage the breeding of flies, ends both of which can be served by other means.

INSULIN TREATMENT OF NEURODERMATITIS

For years eczema has been supposed by many to be connected in some vague way with carbohydrate metabolism —a belief eagerly shared by the lay public. One of the most popular therapeutic restrictions on sufferers from this condition is the elimination of sugar, and articles of diet containing it, from the daily food supply. Estimations of blood sugar have been made at various times in the hope of finding some scientific basis for this idea ; but although amounts higher than normal have been found in some cases, the results have been too irregular and uncertain for any definite conclusion to be drawn. But lately the good effects on the skin of insulin shock therapy have been demonstrated with some frequency, and two American observers[1] have now published reports of a striking series of cases of what they describe as neurodermatitis, or atopic eczema, treated with mild hypoglycaemic shock. All the cases, five in number, were patients in a sanatorium for the treatment of mental disease ; they were not a type, therefore, from which one would expect to get good therapeutic results. Two had for several years been sufferers from eczema, and in all there appeared to be a family tendency towards the development of neurodermatoses. The subjection of these patients to patch tests gave no positive results, and it was impossible to explain their condition by invoking the familiar and magical spirit of allergy, or hypersensitiveness to certain antigens. All five patients reacted favourably to short courses of insulin. The doses given were of the order of 40 to 80 units once or twice a day. In no instance was the dosage pushed to a high limit, and the authors describe their procedure as " subcoma hypoglycaemic shock." Without exception the five cases benefited considerably ; not only did the skin lesions clear up, but the mental condition also noticeably improved. To point the moral and emphasize the contrast between this and other methods of therapy the authors also describe three cases of a similar nature which were not treated with insulin but only with local applications and sedatives by mouth. None of these obtained much alleviation. An interesting question is whether the mental improvement observed was the result of the relief from cutaneous irritation or whether the insulin also has a direct effect upon the nervous system. The skin and the nervous system are both ectodermal structures. At all events any form of treatment which offers a prospect of amelioration for these very difficult and obstinate skin conditions is worthy of further trial and investigation.

[1] *Arch. Derm. Syph.*, Chicago, 1941, **43**, 980.

SECOND ATTACKS OF POLIOMYELITIS

There is still much to be learnt about immunity to virus diseases. Some viruses—yellow fever, for instance—produce an immunity which is apparently life-long and is associated with demonstrable immune bodies in the blood ; other viruses, such as that of herpes simplex, cause recurrent attacks at intervals of months or years. Then, too, it is still uncertain what is the exact significance of immune bodies in the blood. In psittacosis immunity would seem to disappear when immune bodies are no longer demonstrable in the blood, but, on the other hand, there is evidence that herpes simplex can recur even though the immune body titre of the blood is relatively high. In the case of poliomyelitis it is generally conceded that a relatively substantial and lasting immunity is conferred through invasion of the nervous system by active virus ; nevertheless there are well-authenticated accounts of second attacks in man, and second attacks have also been produced experimentally in animals. In face of this apparent contradiction some observers have denied the existence of active immunity in poliomyelitis, although it is usually found that an animal is resistant to reinoculation with the same strain of virus: but it is uncertain whether this immunity is due to humoral factors, whether it is generalized and involves the whole of the central nervous system, or whether it is restricted to a particular portion. To throw some light on these questions experiments have been undertaken by Howe and Bodian.[1] It is well known that the rhesus monkey can be infected with poliomyelitis by a variety of routes. Thus when monkeys are inoculated intracerebrally, intraocularly, intracutaneously, intraperitoneally, intraspinally, and intraneurally they show no lesions in the olfactory tracts, despite the appearance of severe paralyses. Similarly, after intranasal inoculation there are no lesions in the ciliary ganglia. This would seem to indicate that virus is not distributed throughout the central nervous system but is restricted to certain neuronal systems. Monkeys inoculated by one of these possible routes were therefore reinoculated, after recovery from the primary infection, by another portal of entry. Monkeys convalescent after intracutaneous and intracerebral inoculations developed further paralyses after intranasal instillation of another strain of poliomyelitis virus, while, when convalescence had followed intranasal instillation, extensive lesions occurred after intraocular injection of heterologous virus. On rare occasions a second attack may also follow inoculation with the homologous strain of virus. Thus two animals in which during the first attack paralysis had been limited to an isolated segment of the spinal cord contracted typical paralyses in the uninvaded portions of the central nervous system after intranasal inoculation of homologous virus. The essential factors in producing a second attack of poliomyelitis in the rhesus monkey are therefore the portal of entry, the strain of virus used, and the degree to which virus is disseminated through the central nervous system during the primary attack.

[1] *J. exp. Med.*, 1941, **74**, 145.

It is by no means clear how much of the experimental work on the rhesus monkey can be applied directly to the problem of immunity to poliomyelitis in man. It has been suggested that with increasing age most persons do acquire an effective immunity against poliomyelitis, and that this immunity may be due to contact with active virus rather than to mere physiological maturation or other metabolic factors. The concept of "abortive" poliomyelitis as an immunizing agent, however, rests chiefly on the postulate of a general immunity of the central nervous system produced by a limited invasion of virus. Actually nothing is yet known concerning the amount of invasion which may take place in human abortive and non-paralytic forms of poliomyelitis or their antigenic effects. The experimental findings of Howe and Bodian nevertheless suggest that as regards the central nervous system an immunity of this type would not be very substantial, for its influence would be restricted to the region of immediate exposure. In man there is growing evidence that the intestinal tract constitutes the portal of entry of the poliomyelitis virus. To produce an effective immunity in man a primary attack would thus conceivably have to close portals leading to the central nervous system along various peripheral nerves. At the moment one can do no more than speculate on the means by which this might be accomplished. In the monkey it is obviously difficult even by an actual paralytic attack to close multiple portals of entry from within. If immunity in man is produced by inapparent virus activity it may possibly therefore be brought about by the closure of portals from without, either through the participation of humoral factors or not inconceivably by some change in the mucous membrane whereby passage of the virus is seriously impeded.

DICKENS AS CLINICAL OBSERVER

A delightful paper on "Charles Dickens: Neuro-psychiatrist," by Dr. W. Russell Brain, appeared in the January number of the *London Hospital Gazette*. With apt quotations he shows how Dickens realized the value of neurological symptoms to the novelist: "Dickens was a specialist in eccentrics, and he seized upon the eccentricities produced by nervous disease as a rich field for his descriptive genius." As a neurologist Dr. Brain is impressed with the fidelity of Dickens's clinical records of nervous disease. "He had no medical training, and lived and wrote when little was known about the physiology of the nervous system and nothing of cerebral localization, yet his description of nervous symptoms are so detailed and accurate that they can justly be compared with those given by clinicians of genius. Let Dickens demonstrate some of the cases to us." The first is a case of head injury from *Great Expectations*. The patient is Mrs. Joe Gargery, the blacksmith's wife, and the narrator is her young brother Pip. From the data Dr. Brain has no difficulty in diagnosing a severe contusion of the left temporo-parietal region causing jargon aphasia and word deafness and some traumatic dementia, with injury to the 3rd or 6th cranial nerve leading to diplopia. Case 2 is that of the second Mrs. Dombey's mother, who suffered from cerebral arteriosclerosis, and his commentator notes the skill with which Dickens conveys the relentless progress of the disease, with its insidious onset and catastrophic exacerbations. Not only does he draw an accurate picture of the course of cerebral arteriosclerosis, but Dickens shows here that he knows that loss of speech is associated with paralysis of the right side of the body and that in such cases there may also be agraphia. The last hours of old Anthony Chuzzlewit give Dickens an opportunity to describe a series of convulsions resulting from cerebral arteriosclerosis and ending fatally. In *Bleak House* Dr. Brain finds no flaw in Dickens's picture of Mrs. Smallweed's senile dementia; and here too, side by side with her, is grandfather Smallweed, an almost immobile victim of primary lateral sclerosis. Many other forms of mental and nervous disorder are well portrayed in the novels. "No better example of chronic hypomania could be found in a textbook of psychiatry than the lunatic gentlemen in *Nicholas Nickleby*, who made advances to Mrs. Nickleby over the garden wall . . . the elation, grandiosity, flight of ideas, amorousness, and loose paranoid delusions are all typical." Simple-minded Dr. Dick in *David Copperfield* is neatly docketed as a high-grade mental defective, and Dr. Brain quotes a favourite passage—David's first meeting with his great-aunt and Mr. Dick at Dover—to show the concrete type of thinking which in such defectives replaces normal abstract thought. Some other characters are briefly mentioned, such as the Fat Boy in *Pickwick Papers*—"surely the first recorded case of narcolepsy associated with obesity"—to make the point that when Dickens became a novelist medicine lost a great clinical observer. Well, we have his novels, and here is a colleague to help us enjoy them again as doctors.

COMMITTEE ON MEDICAL SCHOOLS

As noted in our Parliamentary column last week the Minister of Health has announced the appointment of a committee of ten by the Secretary of State for Scotland and himself "to inquire into the organization of medical schools, particularly in regard to facilities for clinical teaching and research, and to make recommendations." The committee had been appointed in connexion with the Government's post-war hospital policy, the principles of which were set out in a statement made by the Minister of Health in the House of Commons last October. On that occasion it was made clear that in working out the details of the Government's proposals special consideration would be given to the position of teaching hospitals and to the question of aiding them by way of increased educational grants. This particular aspect of the future of hospital services is to be examined by the new committee. The committee is not concerned with the curriculum for the training of medical students, but with the organization of medical teaching and its relation to the universities on one hand and to the teaching hospitals on the other. It will consider such questions as the proper organization and distribution of medical schools; the appointment and remuneration of teaching staff; the provision of an adequate range of cases for study and of suitable equipment, including the possibility of linking hospitals for teaching purposes; and the organization of postgraduate teaching, both for students specializing in some particular branch of medicine and for practitioners wishing to attend refresher courses. Letters should be addressed to the Secretary, Committee on Medical Schools, Ministry of Health.

CHANGES OF ADDRESS

In 1938 many notifications of change of address were received every week at headquarters from members of the B.M.A. The number had naturally risen with the growing membership. Each change was recorded at once, and a new plate made for the *Journal* wrapper. Since the outbreak of war a large part of the profession has become migratory, and the stream of new addresses is now a torrent, which is swollen by notifications of change of rank from members in the Forces at home and abroad. The small staff who attend to this business cannot keep pace with the work as in peacetime, and new hands are no longer procurable. Members are asked not to throw further strain upon an overdriven executive by writing to complain of delay.

THE STERILIZATION OF PARAFFIN SURGICAL DRESSINGS

BY

R. MAXWELL SAVAGE, B.A., F.I.C.
Chief Chemist, S. Maw, Son and Sons, Ltd.

Surgical dressings impregnated with mixtures having a greasy basis are now common, but so far as I am aware there is no published bacteriological information on the effectiveness of the processes proposed for their sterilization.

Methods described in an E.M.S. Circular

In February, 1941, the Ministry of Health issued a circular (E.M.S./Gen./343) for the guidance of medical officers in Emergency Medical Service hospitals and first-aid posts (see *Journal*, March 29, 1941, p. 489). This described, in two footnotes, methods for the preparation and sterilization of two of these dressings, as follows:

> "*Footnote 1.*—To prepare sterilized vaseline dressings, half fill a biscuit tin with vaseline, stand the tin in a deep dish of water which is brought to boiling point on a stove or fire. When the vaseline is melted, drop into it pieces of gauze or lint about 6 inches square, folded in two, until the tin is full. Add more vaseline, if necessary, to cover the dressings. Leave the tin in the boiling water for half an hour. Then remove, put on the lid, and seal with a strip of strapping.
>
> "*Footnote 2.*—Tulle gras, originally a French preparation, may be prepared in the following way. Curtain net, with a mesh of 2 mm., is cut into pieces 9 cm. square. These are placed in a tin box of slightly larger size. The box is then filled with the following mixture: soft paraffin 96 gm., balsam of Peru 2 gm., sufficient to impregnate and cover the material completely after sterilization by heat in an autoclave. The French preparation contained also halibut-liver oil, but the value of this when applied locally is doubtful, and it can be omitted."

These footnotes at first sight conflict with the requirements well known to be necessary for sterilization, and have not passed without comment (Forbes, 1941). A closer consideration showed that so far as Footnote 2 was concerned there were some points of peculiar technical interest, and the matter called for experimental investigation.

Experiments Dealing with Footnote 1

Throughout this paper I have assumed that soft paraffin *B.P.* has the same bacteriological properties as the proprietary material mentioned in the circular, and have employed it in the experiments.

It has been known from the earliest days of bacteriology that although aqueous liquids usually become sterile when heated to 115° C. for thirty minutes, oils do not, but require 150° C. for one hour, methods which are described in the appropriate books of reference—for example, the *British Pharmacopoeia, 1932*, Appendix XVIA. It is obvious from Footnote 1 that extremely primitive conditions are assumed to be all that are available, presumably resulting from enemy action; but, even so, it is difficult to understand why this particular method was believed suitable. Actually, on account of the negligible vapour pressures which oils develop at 150° C. they are easier to sterilize, in the absence of proper equipment, than water, and any apparatus in which a cook could deep-fry will do the work, even under camp-fire conditions, though a thermometer would be a most desirable addition to the equipment. The E.M.S. process cannot be expected to produce a temperature above 95° C.—possibly much less—and it was in no expectation of finding sterility that the matter was put to proof.

The Testing Method

The usual method of testing sterilization is to enclose organisms of known resistance in the dressing and then to inoculate these into nutrient broth. This can hardly be done with these greasy substances, so it was decided to test the dressings themselves. There are difficulties in testing dressings (mainly connected with aerial infections), and for quantitative details of these difficulties, and of a method of circumventing them, reference must be made to a paper of mine (Savage, 1940). This method requires that the test shall be made upon ten dressings (or portions of a dressing) simultaneously and in random order with a control test upon ten dressings similar to those under examination except that they are certainly known to be sterile as the result of laboratory treatment. Two conditions are essential: (1) not more than four of these control cultures may be positive; (2) the size of the test portions must be chosen so that (if the dressing is not sterile) the average number of organisms in each portion is at least nine. In practical cases these conditions are usually satisfied, and merely indicate limits beyond which the method fails to give sufficiently certain results. When these conditions are satisfied, dressings may be taken as infected when all the test cultures but not more than four controls are positive, and as sterile when at least one test culture is negative, whatever the condition of the controls. If more than four controls are positive, infection of the dressings cannot be inferred with enough certainty, and the whole test is rejected without drawing any conclusions. These are again limiting states—normally, sterile dressings give many more than one negative culture, and four infected controls are rare. The judgment of the operator is substituted by simple enumeration having an underlying statistical basis, to which reference is not normally required but which can always be calculated if necessary. All the work in this paper, except for certain preliminary trials, was conducted according to the above scheme. It was sometimes possible to obtain additional information by examining the positive cultures: for example, non-sporing organisms such as cocci cannot be the sole survivors of mixed populations which include spores, and must therefore be contaminants arriving after sterilization, of no importance in the present work.

Soft paraffin does not melt at incubator temperature, and if a mass of it is introduced into a medium it must be a matter of chance whether or not an organism is so placed that it can grow. Moreover, the tulle gras contains an antiseptic, and there was a possibility that bacteriostatic action would interfere with a simple test. Attempts were made to remove the oil by dissolving it in light petroleum in an apparatus in which the solvent was passed through a Chamberland filter candle into the vessel with the dressing, and removed through another candle, thus filtering off the dressing with any organisms in a sterile circuit. Practical difficulties arise owing to the high viscosity of the solutions, and the method was abandoned in favour of a simple one. Workers on the sterilization of oils (Coulthard, 1935; O'Brien and Parish, 1935) found that when a layer of infected oil is floated on to a medium, growth in the medium occurs. By adding the dressing to a layer of sterile light liquid paraffin (*B.P. 1932*, Fourth Addendum), floating on nutrient broth, the soft paraffin dissolves on warming, and the final result is a two-layer liquid system just as in the tests upon oils. Since the test depends upon the numbers of the viable organisms in the unsterile dressing being above a certain minimum it was vital that the powers of growth of the organisms should not have been so far diminished that the basis of the method was unsound. If single organisms coated with soft paraffin give rise to growth in the medium, pieces of dressing containing, say, 500 organisms must do so with an overwhelming degree of probability. Pieces of lint thread about 0.5 cm. long contain organisms in about 50% of the samples taken, and most of these organisms will be found singly. One series of threads was taken direct into broth, and another was dipped in sterile soft paraffin and then inoculated into the liquid paraffin layer of the special medium. Of the first series 9 out of 16 were infected; of the second 4 out of 18. It is not possible from these short series to deduce accurately to what extent the oil inhibited development—actually the results are not statistically different—but at least it seemed certain that material so lightly infected that most of the inocula contained not more than one organism was capable of giving positive cultures in some cases. The original reasoning could scarcely be disturbed at all when pieces of lint containing hundreds or thousands of organisms were inoculated. The final method of testing adopted was as follows:

Six-ounce screw-capped jars were used, and about 50 mils of light liquid paraffin were placed in each. The jars and contents were then sterilized in a hot-air oven at about 150° C. for several hours. About 25 mils of nutrient Lemco broth was added, and the whole then autoclaved at 115° C. for thirty

minutes. The jars were used hot from the autoclave, and the dressings were lifted out of the melted grease by sterile forceps, drained a few seconds, then added to the medium and incubated for at least five days at 37° C.

In preliminary tests twenty-five pieces of lint, 3 inches square, were prepared by the E.M.S. method, using soft paraffin which had been exposed to the air of the laboratory for some weeks and was therefore somewhat dusty. All cultures were infected. Finally the full technique was applied. All the ten experimental dressings were infected, but none of the ten controls showed growth, thus proving that the process had failed. The general behaviour of the cultures—the rapidity and character of the growth—was entirely different from that given by partially sterilized dressings, and was strongly suggestive of gross infection.

The experiments of the next section are confirmatory, since they show that even 120° C. for 30 minutes is not effective in the absence of balsam of Peru. Measurements of temperature showed that the maximum reached by the E.M.S. process was 94° C., and if more soft paraffin was used a temperature of as low as 65° C. might have been all that was attained after the prescribed period of heating. A process for producing sterile soft paraffin dressings has been published (Smallwood, 1941), and, although no bacteriological tests have been reported, it consists in a careful application of known conditions and can scarcely be wrong. It might not be easy to carry out on a large scale (it was not meant for this), but there is nothing inherently difficult in the production of a sterile dressing by one means or another.

Experiments Dealing with Footnote 2

In the directions given in Footnote 2 an autoclave is used. Autoclaving oils is not an effective method of sterilizing them, but tulle gras has two important features which may profoundly influence sterilization. A 2% mixture of balsam of Peru and soft paraffin may be an ineffective disinfectant at room temperature, but in an autoclave it may have enhanced action. Moreover, cotton normally contains about 6% of moisture, which, when heated under conditions preventing its free escape, is amply sufficient for the sterilization of the cotton at autoclave temperatures and pressures (Savage, 1937). Autoclaving a mixture of cotton and soft paraffin is not the same as autoclaving soft paraffin alone, since it is conceivable that steam might reach spores which were not too far from the fibres. Every experiment was conducted by autoclaving at 120° C. for 30 minutes.

Balsam of Peru is not completely soluble in soft paraffin, and the mixture used was decanted from the insoluble residue. In the foregoing experiments somewhat dusty but not specially contaminated materials were used. In those which follow the lint was dusted with a specimen of earth containing spores that survived exposure to saturated steam at 116° C. for 30 minutes. It is admitted that this is unusual but not unprecedented resistance and that the tests were severe, but it will be shown that under proper and easily reached conditions even these organisms can be killed. In the first experiment one of the 10 experimental dressings grew an organism which on examination proved to be a coccus (possibly *Micrococcus luteus*) and therefore certainly a contaminant. Of the 10 in the control series 2 were infected, one with a coccus (apparently also *M. luteus*) and therefore certainly a contaminant, and the other with a sporing bacillus, which might be either a contaminant or a survivor. All the remaining 17 were sterile after six days' incubation. Bacteriostatic action was evidently not sufficient to prevent the growth of the almost certainly single viable cells or groups, and the 17 showed abundant growth when subsequently infected with earth. Sterilizing tulle gras in an autoclave at 120° C. for 30 minutes is therefore an effective process. This effective action may be due to the balsam of Peru, to the moisture, or to the two combined. These factors were investigated in turn.

Moisture.—Lint was used in soft paraffin without special treatment beyond earth contamination. None of the controls was infected, but all the experimental cultures showed growth, although one did not do so until the fourth day and another not until the fifth. The latter proved to be a sporing rod of very slow growth, apparently in pure culture. Although formally the experiment shows lack of sterility and it is evident that the process is not efficient, the supplementary evidence suggests that a considerable degree of destruction had occurred, reducing the bacterial population to a few forms, probably in small numbers.

Balsam of Peru.—The contaminated lint was dried at about 110° C. for an hour and was then quickly immersed in warm balsam of Peru mixture. After autoclaving and testing, all the experimental cultures, but none of the controls, were infected. Evidently balsam of Peru alone is not the effective agent.

Moisture and Balsam of Peru.—Contaminated lint was taken, and in order to use it in a moist condition it was kept over saturated sodium chloride solution for 24 hours. A specimen then contained 7.04% of moisture, which is slightly above that usual in the climate of London, 6.5% being about the average. The usual treatment was applied. None of the control cultures was infected, but there were two infections in the experimental cultures, both being different species of sporing rods, which on plating seemed to be in pure culture. The formal result indicates sterility, and the supplementary observation supports the view that aerial contamination accounts for the two infections. This experiment therefore supports the first of this series and indicates that satisfactory sterilization can be carried out by the method of Footnote 2.

Experiments in which special contamination is not used may be inconclusive, since there may be no highly resistant spores present, but the conditions are closer to actual practice. An experiment was made with dry and moist (7.1%) lint, similar to the last one but with no special contamination. All the dried specimens were infected; there was one infection in the moist cultures and two in the controls. Evidently the results are similar even in this case.

Commentary

It is evident that the success of the process depends on the simultaneous presence of moisture and balsam of Peru. Moisture in cotton is not a constant quantity, but varies with climate and, although always normally present, can be removed without difficulty. In fact, Smallwood (1941) removes it to facilitate impregnation, but since he subsequently uses a sterilizing process which is independent of moisture, this does not matter to him.

When it is realized that, in addition to this variable quantity of moisture, balsam of Peru is a natural product with at least three major groups of constituents, and that the preparation of the ointment-like basis may vary, it becomes obvious that complications may arise, and the process appears to be delicately balanced. It is hoped to continue the investigation of the details, but it seems possible that, in this case, sterilization depends on the presence of sufficient hydrogen ions, which would be provided in tulle gras by the simultaneous presence of moisture and of an acid soluble both in oil and in water, but not by either ingredient separately. Some support is lent to this hypothesis by the observation that damage resembling that caused by acids occurs to a greater extent in the normal lint than in that which has been dried, in spite of the additional heating which the latter has had.

The inclusion of the details of sterilization methods in specifications involves dangers which are illustrated by the above experiments. Experience shows that, once published, these methods display an astonishing vitality. There is every reason for the publication of methods as scientific communications, or merely as guides, but sterilization specifications would, in my view, be better if the simple requirement of sterility were substituted for a detailed description of what, even if right, may not be the only method, and perhaps not the best. The responsibility for producing the sterile dressing would then devolve upon those to whom the sterilization was entrusted.

Summary

Methods for testing dressings impregnated with greasy material are described.

The water-bath method of sterilizing soft paraffin dressings is ineffective.

Tulle gras can be sterilized in an autoclave, provided that enough balsam of Peru is present and that the cotton is normally moist.

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THE EMERGENCY SURGICAL STATION

BY

K. VERNON BAILEY, M.C., M.D., M.R.C.P., F.R.C.O.G.

The problem of the evacuation of casualties under conditions of enemy invasion of this country and their adequate accommodation and treatment after evacuation has always exercised the minds of those responsible. It is recognized that the conditions would differ greatly from those ruling in an expeditionary force operating over-seas, in so far as there would be no such thing as a "back area" and civilian casualties of both sexes would be added. Schemes have been worked out in conjunction with military and Home Guard exercises on the large scale for the evacuation of casualties from the fighting areas, and in this connexion a degree of understanding exists between these and the civil medical services. The weakness of any such scheme, however, occurs in the presumption that the established hospitals, situated in the towns and cities to which these casualties would ultimately be transferred, would so far survive the effects of enemy action as to be able to deal constantly with the influx of admissions. Should, however, the function of these hospitals fail in an appreciable degree—as well it might from single direct hits—the vital end-link in the chain of evacuation from a wide area of military action would be broken. This would apply particularly to the many small townships with only one hospital.

Relieving the Overtaxed Hospital Services

To this end, therefore, it is advisable to establish a plan whereby as much strain as possible is taken from the hospital services, and an efficient way of doing this is by segregation of a section of the surgical work normally expected to be carried out at the hospital itself. There are probably two conditions under which the hospital services might become severely overtaxed, and, therefore, under which the establishment of an emergency surgical station would be invaluable. These are (1) invasion proper, and (2) prolonged aerial attack on our large cities and built-up areas, either as a pre-invasion procedure or as a last attempt to break civilian morale. However the fortunes of war may wax or wane, it is obviously necessary to prepare the country to withstand such an assault, the chief danger of which lies in the production of casualties in excess of what can be dealt with expeditiously and concurrently.

Some disadvantages under which the established hospital functions from the point of view of its use in an invasion are: (1) Inadequate number of beds. (2) Beds occupied by cases recently operated upon but not serious; these block urgent serious admissions. (3) Time taken in continuously operating upon major and less serious cases; this imposes a perpetual strain on the staff. (4) Continual employment of material—for example, bedding, linen, etc.—for the less serious type of case. (5) Danger to serious cases by contact with infected ones of minor degree. (6) Constant risk of limitation in services by enemy action. The work of the hospital surgical department should therefore be restricted to those cases which require treatment under prolonged anaesthesia and subsequent nursing under hospital conditions—for example, abdominal, thoracic, and head injuries, severe burns, and compound fractures. These cannot be dealt with elsewhere, and the medical and nursing staffs, theatre, and material possessions of the hospital are thus used to the fullest advantage.

In order, therefore, to relieve the strain on the resources of the surgical departments of established hospitals advantage should be taken of modern advances both in surgical technique and in the science of non-inhalation anaesthesia. By a consideration of these factors it will be seen that a large percentage of cases which are admitted to the surgical wards could in an extreme emergency be adequately dealt with at an emergency surgical station established apart from the hospital itself but having adequate communication with it for supplies.

Location and Functions of Surgical Station

This emergency surgical station should be established in towns and cities in conjunction with local hospitals and at a convenient distance therefrom. The function of this unit is based upon two main facts: (1) The necessary surgical treatment can be carried out under sedative pre-medication and anaesthesia by the intravenous or local methods only. (2) Accommodation and nursing of patients are greatly facilitated by the almost complete absence of post-operative vomiting and post-operative chest complications. Sanitary control is facilitated. These two factors would thus render it possible, without undue risk to patients: (1) to accommodate a larger number of cases in a given space; (2) to nurse them with a much smaller staff; (3) to use simpler forms of ward and theatre furniture than is the case in the organization of a general hospital.

The chief surgical conditions which can be dealt with adequately by the emergency surgical station are: (1) Minor or simple amputations under anaesthesia. (2) Reduction of dislocations and simple fractures under anaesthesia; treatment by splints. (3) Cleansing and suture of lacerated wounds with superficial drainage under anaesthesia; sulphonamide treatment. (4) Removal of superficial foreign bodies under anaesthesia. (5) Arrest of haemorrhage by ligature under anaesthesia. (6) Treatment of shock by intravenous saline. (7) Treatment of localized burns by dressing under anaesthesia. (8) Superficial primary repair under anaesthesia. This list includes many of the more common types of casualty, the outlook for which depends more upon promptitude in treatment than upon facilities that can be provided only at a general hospital. Surgical treatment, however, under sedative pre-medication followed by intravenous anaesthesia is possible in all of them. These are the cases which, under conditions of extreme stress, would unnecessarily congest the surgical wards of hospitals.

It must be remembered that the work done at the emergency surgical station is designed to relieve other main services. The immediate saving of life and prevention of permanent injury transcend, therefore, the need for that degree of surgical asepsis and amenity which is to be desired under more ideal conditions, and technique directed to the perfection of result must also be waived to the same end. It is not necessary, therefore, to equip the "wards" or "theatre" with other than the minimum necessities. I suggest that the emergency surgical station should be established in a separate building or in one or more large underground basements possessing adequate ventilation and easy means of entry and exit. Two or three wards and an operating theatre should be arranged for, and the simplest ward and theatre furniture installed—for example, the beds could be of a simple wooden type and the operating table (or tables) could also be made of wood, as only the horizontal position would be necessary.

Equipment and Staffing

It is difficult to list exact requirements for this unit. These would, of course, depend largely upon supplies available. However, as a basis the following stocks should be on hand; they could be readily renewed from hospital stocks:

1. Large drums containing sterilized dressings, gloves, etc. (no gowns required), spirit sterilizer.

2. Box containing necessary surgical instruments: scalpels, Spencer Wells, scissors, sinus forceps, dissecting forceps, tissue forceps, towel clips, retractors, aneurysm needle, needle holders, needles, tourniquet, probe, catgut, silkworm gut, rubber tubing, 20-c.cm. syringe for irrigation.

3. Box containing 10-c.cm., 5-c.cm., and 2-c.cm. syringes with stock of hexobarbitone, evipan, pentothal, and novocain.

4. Wooden splints, bandages, wool, elastoplast.

5. Intravenous saline apparatus and store of normal saline.

6. Drugs (morphine, coramine, etc.); sera (A.T.S., anti-gas-gangrene serum); antiseptics (surgical spirit, dettol, sod. chloride, ether soap).

7. Metal pails, bowls, bed-pans, etc.

The staffing with both medical and nursing personnel need not present too great a problem. An emergency surgical station of fifty beds could be controlled by three experienced medical officers, two surgeons, and an anaesthetist. These could be drawn from medical men serving in the Emergency Medical Service, or, alternatively, chosen from the ranks of doctors who have had the necessary hospital experience to enable them to undertake the work. A list or rota of such doctors or surgeons should be made so as to enable relief to be effected smoothly. A certain number of trained female nurses should similarly be detailed, and additional staff could be drawn from trained Home Guard medical orderlies. The number of beds in the emergency surgical station need not be great, as the type of case dealt with allows for relatively speedy transference to other quarters. The service of the emergency surgical station is distinctive in so far as in no other operative unit can commensurate numbers of casualties be dealt with under such limited conditions of equipment and accommodation. This is rendered possible by the avoidance of inhalation anaesthesia, which both increases the need for personnel, material, and suitable environment and introduces the risks of post-operative complications.

Conclusion

I have endeavoured to survey (1) the need for establishing an additional form of surgical service which, I believe, will be called for under those conditions that would obtain during an enemy invasion of this country or the pre-invasion stage; and (2) the possibility of staffing such a service adequately under the extreme emergency that would then exist. In advocating this addition to the medical service in action I realize the transgression of surgical tenets that is involved. The surgical treatment of cases with limited amenities, with a paucity of material, and with inadequate aseptic facilities cannot, of course, commend itself. Faced with uncommendable conditions, however, as we should be, this form of service probably possesses potentialities which are likely to outweigh its surgical crimes.

It is essential that these emergency surgical stations should be established at suitable sites beforehand, their personnel appointed, and their equipment rendered available at short notice. Cases suitable for treatment at these stations can be sent direct from the field medical services or referred by the admission authorities at hospitals. The system of *triage* greatly assists this end. In the main the effect would be to decentralize somewhat the hospital surgical work, with consequent vital relief.

It is my belief, therefore, that the emergency surgical station is a necessity in the defence of this country in so far as it assists in ensuring the treatment of all casualties without delay.

The best ways of securing the speedy return of injured workers to their jobs, with consequent saving in man-power, were discussed at a recent conference, the first of a series, at the Birmingham Accident Hospital. The audience included doctors, employers, welfare managers, and nurses. Mr. William Gissane, clinical director at the hospital, spoke on the part to be played in rehabilitation by the industrial medical officer. The works doctor in Birmingham would have much to do with the first treatment of cases going to the Accident Hospital, and this part of the treatment must be not only uniform but up to date and in accordance with modern methods. The works doctor should keep in contact with the hospital throughout the patient's stay, and be fully conversant with progress, so that he might allay the insecurity commonly felt by injured workmen with regard to future earning capacity. In this connexion the works doctor was responsible for obtaining the co-operation of the management in promising to reinstate the man at the end of treatment. When the hospital could do little more, rehabilitation by every other possible method became necessary. The works doctor should arrange for alternative or light work—"trial occupation." Knowledge of various types of work would enable him to place a man in occupation of therapeutic value likely to restore him to fitness for his original job. Once the feeling of insecurity had been removed the patient's full co-operation could be obtained and treatment therefore become more effective. Mr. E. A. Nicoll, medical director of the Miners' Rehabilitation Centre at Mansfield, showed a film concerned with the reinstatement of injured miners. He claimed that the film proved the value of a co-ordinated scheme depending on full co-operation between industrial medical officer and hospital surgeon.

ECONOMY IN USE OF BACTERICIDES

The following memorandum has been drawn up by the Therapeutic Requirements Committee of the Medical Research Council.

The present position regarding supplies of materials used as bactericides and disinfectants is such that every economy must be effected. In the national interest it is necessary not only to select those materials which are most readily available but also to reduce the total consumption. Large quantities of disinfectants are used in hospital and private practice under conditions in which they are not likely to be effective. Unless efficient mechanical cleansing of utensils which have contained infected material is carried out, subsequent treatment with a disinfectant may be useless. Sterilization by heat is always preferable to the use of disinfectants, and should be employed whenever practicable. Two usual types of disinfectants are the mercurial compounds and the phenolic group. Mercury has to be imported, and it is in heavy demand for the manufacture of munitions. We must therefore rely mainly on the indigenous coal-tar disinfectants. Phenol itself, and certain of the constituents of cresol *B.P.*, which is the basis of disinfectants of the lysol type, are urgently wanted for the manufacture of plastics used in aircraft construction. There is, however, no reason to fear any shortage of disinfectants provided the more highly purified substances are not used for purposes for which the cruder materials would suffice, and provided the coal-tar disinfectants are replaced, where possible, for special purposes by disinfectants such as formaldehyde, hypochlorites, and chlorinated lime.

It would be in the national interest if phenol and cresol could disappear as completely as possible from medical practice. For general disinfection the use of cresol with soap solutions, of the lysol type, should be reduced to a minimum and replaced by the cruder disinfectants of the "black fluid" or "white fluid" type, or, for certain purposes, by chlorinated lime. The same is true of the chlorinated phenols; for though they are highly efficient for special purposes, such as disinfection of the skin, it is wasteful to use them where the cruder disinfectants can be employed. M.R.C. War Memorandum No. 6—"Prevention of Hospital Infection of Wounds—Appendix C"—contains details regarding the use of disinfectants of the phenolic type for various purposes, and the recommendations which follow are partly based on the information there given.

The Committee's Recommendations

In general, bactericides should not be used when disinfection by heat is possible. Heat treatment is more efficient and reliable. Infected matter should be removed, with all due precautions, by scrubbing and scouring, where practicable.

Storage of Instruments and Suture Needles.—These may be kept in liquor boracis et formaldehydi *N.W.F.* and rinsed with sterile water before use. This method should not be used for hypodermic needles.

Rubber Tubing.—This should be sterilized by boiling at the time of using. If it is thought necessary to have sterile tubing ready, it can be autoclaved and kept in a sterile towel.

Rubber Sheeting.—Scrubbing with soap and water is all that is necessary unless the sheeting is known to be contaminated in an exceptional way. Heavily contaminated sheeting should be scrubbed and then boiled or autoclaved; if this is impossible it should be scrubbed and sponged over with rag soaked in lysol (1/2 fl. oz. to 1 pt. water) and then rinsed thoroughly with tap-water.

Linen.—This should be boiled if possible; otherwise it should be soaked overnight in a dilution of a "white fluid" disinfectant having a Chick - Martin coefficient not lower than 3 (1 fl. oz. to 1 pail of water is usually strong enough with a good "white fluid."

Baths.—Lysol, undiluted, should be rubbed thoroughly over the surface, using a mop or rag in a gloved hand, for at least one minute. The bath should then be washed well with tap-water.

Other Surgical Utensils: Arm-baths, Bowls, Dishes, etc.—These should be boiled whenever possible; otherwise they should be disinfected as for baths, and washed finally with sterile water.

Bed-pans.—If sterilization by heat is impracticable, thorough mechanical cleansing by flushing and scouring, followed by the use of a "white" or "black" fluid disinfectant is recommended.

Excreta.—When direct disinfection of excreta is necessary a "black" or "white" fluid, having a Chick - Martin coefficient not lower than 3, should be used in accordance with the instructions issued by the manufacturer (1 fl. oz. to 2 qt. water is usually advisable).

Sinks; Drains.—Thorough flushing is most important. Chlorinated lime is a cheap and efficient disinfectant. Washing soda—1 oz. to 1 qt. hot water—may be used for cleansing glazed earthenware. A " black fluid "—1 fl. oz. to 1 pail of water—may be used as a deodorant.

Floors.—As a deodorant a " black fluid "—1/2 fl. oz. to 1 pail of soapy water—may be used. For local pollution a " white fluid " or a " black fluid "—4 fl. oz. to 1 pint—should be used.

Phenol Antiseptics

" *Black Fluids* " and " *White Fluids* " are emulsions of phenolic substances. For most purposes " black " and " white " fluids, if of the same efficiency as judged by the Chick - Martin coefficient, are equally suitable. The tendency of " black fluids " to cause staining, however, may be a disadvantage in some cases.

" *Black Fluids.*"—The British Disinfectant Manufacturers' Association states that the following British proprietary disinfectants are of the " black fluid " type: antifect; bactocene; coetas; disolite; exenol superior; hycol; hygenol fluid disinfectant; ialine special; Jeyes' fluid; kilcrobe 10/12 black; killgerm 10/12 black; Lawes'; metro; monsanto black disinfectant No. 4; sanitas-bactox; septol; special creitas; Cooper's standard fluid; vitalin No. 99.

" *White Fluids.*"—The British Disinfectant Manufacturers' Association states that the following British proprietary disinfectants are of the " white fluid " type: baxol X; betazone No. 1; exenol D.A. white; ialine No. 8; izal; Jeyes' white cyllin; killcrobe 18/20 white; killgerm 18/20 white; Lawes' L.W.4; monsanto white disinfectant fluid No. 1; sanitas-okol; sal-hycol; star white; sterilite; superlin white; white bactocene; white kerol; white septol; Wright's vetersol; voxsan M.A.F. disinfectant fluid.

Reports of Societies

MORE ABOUT NUTRITION

The second and third scientific meetings of the Nutrition Society were held in London and at Perth. The London meeting was concerned with food production and distribution in relation to nutritional needs; the meeting in Scotland discussed requirements for health, and was the first of three meetings intended to cover the wider subject of foodstuffs in relation to human needs. The holding of meetings in Scotland and England, and the discussion of very similar subjects in the two countries, does not mean that there are two separate societies. The fact that Sir John Orr gave the opening paper at each is an indication to the contrary. The Scottish Group of the Society has been formed as a matter of convenience, because of the difficulties of arranging meetings for the whole Society in one place under conditions of wartime travel. There is complete interchange of information and opinion between the Committee of the Society and the locally elected committee of the Scottish Group, and members of the one committee have attended meetings of the other.

One very welcome feature of both meetings is to be found in the personality of the chairmen. The morning session in London was presided over by Sir Wilson Jameson; at the Scottish meeting Dr. Andrew Davidson took the chair for both sessions. This recognition of the Society's existence by two of the leading official administrators in Government service is clear proof that problems of nutrition are very much to the fore in the minds of the Government and its immediate advisers. Although Dr. Davidson made it clear that so far, in Scotland at all events, no convincing or even suggestive signs of nutritional deficiency had been detected, he stressed the need for a continuous look-out and for continued preventive measures. Many speakers reinforced this point at both of the meetings, and it was urged that any imperceptible descent to states of " subclinical " deficiency must render increasingly difficult the post-war raising of nutritional levels to those necessary for optimal health.

Food and the People

Sir JOHN ORR called attention in convincing manner to the reciprocal relations between food production and the health of the people. The demands for improved dietary standards must have the profoundest effect on agricultural policy, not only in this country but throughout the world. If the increasing output of protective foods materialized, this could not fail in turn to affect the prosperity of agriculture and, through it, the general level of trade, both internal and international. At the same time, the extended production and consumption of dairy products, vegetables, and fruit would profoundly influence such phenomena as infantile mortality. Sir John again emphasized the unfortunate lack of contact so far existing between different workers in nutrition; many of the problems of social medicine would be illuminated, if not solved, by a consideration of results achieved in the veterinary field, and the practitioners in both human and animal husbandry could jointly benefit from the experiments of the laboratory worker.

Dr. NORMAN WRIGHT, at the London meeting, illustrated with highly interesting figures the rival claims of animals and men for food. He emphasized that any rivalry was largely a wartime problem; in times of peace and plenty the human being and his domestic animals had complementary rather than competitive needs for the world's foods. He also stressed a fact that is often overlooked—namely, the contribution made to the fertility of the soil by livestock in returning a considerable proportion of the nitrogen necessary for animal and vegetable life alike. Mr. E. T. HALNAN, at the same meeting, over which Sir Joseph Barcroft presided in the afternoon, discussed " Animals as Food Converters." His paper revealed, as did the subsequent discussion, a wide divergence of opinion, often more apparent than real, because of failure to work from agreed criteria and standards of measurement. The economic evaluation of any particular livestock must depend much on the age at which the animal went to slaughter; it was also affected by decisions on such complicated questions as whether the cost of producing a calf should include part of the cost of feeding the cow during pregnancy and lactation, and, if so, what part. The concluding session of the London meeting was addressed by Sir JOHN RUSSELL on planning for agricultural production. This, according to Sir John, involved deciding what proportion of our foodstuffs should be produced at home, and on which foods we should concentrate for home production, as we should never be able to provide for all our requirements within these islands. The conclusion that the difficulties of any readjustment would be financial rather than technical is one to which all nutritionists would almost certainly subscribe.

One of the facts that emerged during this meeting, though it was never brought out as a specific statement, is that agriculture is an extremely flexible manifestation of human activity. Apparently minor economic adjustments can profoundly affect the nature and amount of the crops or livestock produced, and can often do this in a surprisingly short time. It would appear, therefore, to be all the more necessary to plan, and to make sure that this is done by the right planners.

Some Food Standards

At the Scottish meeting Sir John Orr's introductory paper was followed by Dr. D. P. CUTHBERTSON'S. Although his title was " Standards for Proximate Principles," he devoted most of his time to a discussion of protein requirements. In his paper, as in those that followed, some critical attention was given to the figures recently put forward in the United States by the Committee on Foods and Nutrition of the National Research Council. In general the figures advanced by these experts received warm approval from those who took part in the meeting, but criticisms were levelled at some of them. Dr. Cuthbertson's finding, from exhaustive surveys of world literature, that protein tended to contribute a constant proportion of the total calories in the diet, had apparently not been applied in certain of the higher-calorie diets considered by the American committee. The verdict of the meeting on this point—whether the caloric contribution of protein should always tend to the same figure—would seem to have been the Scots one of " not proven."

Dr. J. DUCKWORTH, in his paper on standards for minerals, dealt almost entirely with the vexed and complex problem of calcium balance in relation to dietary requirements. Many calculations have been based on the assumption that calcium retention should be related to the weight of the organism, particularly of the growing organism; this led to results quite inconsistent with experimental findings. A better approximation was found by taking into consideration the individual's height, but this also seemed to break down for human beings above the age of about 12 years. It was fairly clear that about 20% of ingested

calcium was generally absorbed; during gestation an intake of 1.5 grammes, and during lactation an intake of 2.0 grammes, were probably quite adequate. There was always a negative calcium balance during lactation, possibly due to parathyroid activity, however high the intake. During the discussion it appeared that the consumption of hard drinking-water was not likely to contribute more than 100 mg. of calcium per day.

The Scottish meeting concluded with a paper from Lieut.-Comdr. C. C. UNGLEY on standards for vitamins. A very exhaustive survey was made, not only of the quantities of vitamins required for various stages of health, from the prevention of manifest deficiencies to a state of optimal nutrition, but also of the symptoms associated with varying degrees of deficiency of vitamins A, B_1, C, and D, and of riboflavin and nicotinic acid. Considerable disagreement on the relationship between gingivitis and vitamin deficiency was the main feature of the discussion following Lieut.-Comdr. Ungley's paper.

A Conclusion

One conclusion must inevitably be drawn by anyone who was present at both these meetings. The field to be covered by the new society is enormous. Its importance is incalculable. Yet so copious is the information available from divers sources on all matters appertaining to human and animal nutrition that every discussion, however much the scope of the subject has been narrowed, seems to suffer from lack of time. It is clear that everything possible should be done to hold meetings of the Nutrition Society as frequently as possible to discuss problems all of which are more directly germane to the national war effort than is perhaps always realized by those who direct the national destiny.

DIAGNOSIS

In the course of his Skinner Lecture, on diagnosis, delivered to the Faculty of Radiologists on March 20, Prof. HENRY COHEN of Liverpool said that all symptoms and signs, subjective discomforts and objective manifestations, had this in common—that they indicated deviations from the normal. But what was the normal? It was a variable, and he considered it no more reasonable to expect an exact answer to the question, "What is normal blood pressure?" than to the question, "What is the normal length of the nose?" There was no sharp line of demarcation, but only transition, more or less gradual, from normal to abnormal, and he uttered a warning against the special danger of assuming the abnormal when data on the variability of the normal were inadequate. It was once said that a normal nasopharynx was so rare that it should be demonstrated to the Royal Society of Medicine whenever found. The normal varied with age and site. Arteries which would be normal at the age of 70 would be grossly abnormal at the age of 30. An ununited lower femoral epiphysis had a different significance at 30 from what it had at 13. Prof. Cohen thought it probable that deviations from the normal represented quantitative rather than qualitative change and were either in the direction of excess (diarrhoea, polyuria, tachycardia, polycythaemia) or of defect (constipation, anuria, bradycardia, anaemia). Another point was that many deviations from normal occurred in the same pattern or group—witness the Charcot triad of nystagmus, intention tremor, and staccato speech, as indicating disseminated sclerosis, and the Hutchinsonian triad of pegtop teeth, blindness, and deafness, as indicating congenital syphilis. A complete diagnosis, he said, must state where the disease is, what functional disturbances are present, and how these have arisen.

F. R. Smith and J. M. Spence (*South. med. J.*, 1941, **34**, 146) record five instances of congenital syphilis in only one of twins. As four of the five instances were observed in forty-four twin pregnancies in forty syphilitic women, the condition is not so rare as might be expected. Apart from the fact that the twins in this series were dizygotic, there is only guesswork to explain the escape of one twin. There are twelve previous records of congenital syphilis in only one of twins. Of these, five are completely accepted, while the others, though probably authentic, lack complete documentation.

Correspondence

Detection and Treatment of Tuberculosis

SIR,—In the *Times* of March 21 very considerable prominence was given to a letter from the President of the Royal College of Physicians in which he strongly advocated an immediate extension on a large scale of mass radiography for the detection of early pulmonary tuberculosis, not only in respect of recruits for the fighting Forces but also industry generally, and, ultimately, the whole nation.

Sir Charles Wilson does not anticipate any serious practical difficulty in the immediate large extension of mass radiography for diagnostic purposes; and although I am not disposed to share his confidence on this particular point I am much more concerned with the practical question of what it is suggested should be done thereafter for the benefit of the thousands of cases of early pulmonary tuberculosis which we are assured will be discovered.

Does Sir Charles Wilson anticipate with equal confidence that immediate suitable treatment will be available for such patients? I am informed on excellent authority that ever since war broke out there has been a very serious shortage of sanatorium treatment available for patients already known to be urgently in need of treatment. If this is a correct statement of fact, what shall we gain by adding a few more thousands of patients with early pulmonary tuberculosis to our already long waiting lists? No one doubts that mass radiography is a valuable aid in the diagnosis of pulmonary tuberculosis, but surely the proper view to take of its real value should be as a component part of a comprehensive scheme for the combating of tuberculosis. Therefore I suggest to Sir Charles Wilson, and to all those who have recently become extremely active in their advocacy of a large immediate extension of mass radiography, that they should advocate no less strongly the very urgent need for a large extension of adequate facilities for the treatment and after-care of cases of early pulmonary tuberculosis. If these facilities are not available we shall only raise false hopes in the minds of patients which will very soon be followed by cruel mental distress and disappointment.

There is one other comment which I should like to make upon Sir Charles Wilson's letter: Is it really wise policy to single out one particular disease for the purposes of a national survey? If we are going to concentrate upon a national survey, would it not be much greater wisdom to advocate the medical examination of every individual at periodical intervals from the point of view of general health? Such an examination conducted much on the same lines as an examination for life insurance or entry into the Public Services, or even the examination by the School Medical Service of children up to 14, could be so arranged as to include mass radiography and thereby not only serve the purposes which Sir Charles Wilson has in mind but also eliminate many serious objections which are certain to be met with when the examination is restricted to the sole object of detecting one specific disease.—I am, etc.,

Criccieth, N. Wales. FREDERICK MENZIES.

Discovery of Symptomless Pulmonary Tuberculosis

SIR,—The manifesto of the National Association for the Prevention of Tuberculosis (Feb. 28, p. 302) is a brave attempt to deal with a difficult subject, but, as Dr. Johnson once said, "In any attempt at conciseness, some degree of accuracy tends to be sacrificed." The manifesto as it stands is in some respects inaccurate and therefore misleading. It is likely to arouse hopes doomed to disappointment, and requires modification on the following lines.

Para. 1.—It is stated that tuberculosis of the lungs begins without any warning to the patient. This statement as it stands without qualification is incorrect. It is necessary to distinguish between tuberculous infection and tuberculous disease. There is no reason to believe that Fishberg was not correct when he stated that there is no active phthisis without constitutional symptoms. This statement was approved by the Joint Tuberculosis Council last year (*vide* J.T.C. Report on Mass Radiography in Tuberculosis). Such symptoms may be and frequently are disregarded by the patient, probably in many cases owing to

economic fears, but when patients are carefully questioned it will usually be found that they have not felt well for some time before consulting a doctor. The symptomless extension of pulmonary tuberculosis, found sometimes radiologically among known patients, is another matter, and is explicable by the development of tolerance. Even here careful supervision will usually reveal symptoms and signs—e.g., increased pulse rate after exercise, loss of weight, higher blood sedimentation rate, and so on. It is incorrect also to state that by the time patients come for treatment the disease is in an advanced stage, unless the view is taken that all diagnosable tuberculosis is advanced. It is certainly the case that many persons suffering from tuberculosis are seen with definite symptoms but in whom minimal lesions are detected on *x*-ray examination.

Para. 2.—*X*-ray examination of the chest does not of itself necessarily detect tuberculosis, and this is certainly true of miniature screen radiography, which would no doubt be employed if *x* rays were used on a large scale. All that such an examination could do would be to indicate a departure from the normal, in which case a full *x*-ray and clinical examination should be made. Unfortunately, *x*-ray examination will not detect infection. There is good reason to believe that at the close of adolescence a substantial proportion of the population are infected with tuberculosis, the percentage steadily increasing throughout life. As the number notified or certified at death as suffering from tuberculosis is far less than the number infected, it is evident that a process of spontaneous cure takes place in the majority of those infected.

Paras. 4 and 5.—The statement that re-examination by *x* rays from time to time (each twelve months is quoted with approval in para. 3) is desirable shows that *x*-ray examination can only detect the abnormal when it is present, and is really a confession of its weakness and limitations. If a preliminary examination by *x* rays were made of entrants into industry, students, etc., and the persons kept under regular observation by a medical officer, it is probable that inspection by an expert medical officer, combined with comparative weight and temperature records, would do a great deal to detect the beginnings of disease, and not only tuberculous disease. Again, why should *x*-ray examination, if so useful, be dropped at the age of 18, as quoted with approval in para. 3?

Para. 8.—The last sentence is really a repetition of the last sentence in para. 1, and one or other might be deleted.

Para. 11.—Further experimental work to determine the most suitable type of apparatus is desirable before large-scale manufacture is begun.—I am, etc.,

Leigh, Lancs. GEORGE JESSEL.

Declining Population

SIR,—Everyone will regret that Sir Henry Brackenbury is no longer with us and able to reply to the letter of Dr. Percy Stocks (March 21, p. 394). Against the apparently reassuring figures of Dr. Stocks I would quote the Registrar-General. We find on page xii of his Preliminary Report on the last Census the following statements: "The present rate is definitely insufficient to maintain a stationary population in the future," and, "In recent issues of the Registrar-General's Statistical Review it has been suggested that a current birth rate of about 19½ per 1,000 would be necessary if a future decline in population were to be avoided. The actual level at the moment is 16% below this standard."

The number of the population at present is kept up by the large proportion of old people. It is obvious that eventually the number of children must be the deciding factor. In 1921, according to the records of the Education Office, the average attendance at school of elementary school children in England and Wales was 5,205,485; by 1938 this number had dropped by 678,784 to 4,526,701. A similar and even greater proportionate decline has occurred in private schools. How can we be optimistic in face of such figures as these unless remedies are found?

Dr. Stocks has misunderstood the object of those of us who have called attention to the fall in the birth rate. We do not say "nothing can be done to prevent it," but rather that something should be done. Methods of dealing with the trend of the birth rate require consideration as a whole, but more generous financial consideration to parents of families and extension of physical assistance such as home help to women of any class in all stages of child bearing and child rearing could be put into operation practically forthwith, and would, I believe, have some effect.—I am, etc.,

Eastbourne. W. G. WILLOUGHBY, M.D.Lond.

Diphtheria Immunization with A.P.T.

SIR,—I was greatly interested in the articles on immunization against diphtheria with alum-precipitated toxoid (March 7 and 14), and the authors are to be congratulated on the thoroughness of their investigation. Their findings are of the utmost value, and their recommendations with regard to dosage should be adopted immediately by all authorities responsible for diphtheria prevention.

In Oldham A.P.T. has been in use since January, 1936, two injections of 0.2 c.cm. being given at fortnightly intervals. This was subsequently increased to 0.5 c.cm. for each injection, and later the dosage was altered to 0.2 c.cm. and 0.5 c.cm., which dosage has been used for the last 18 months; the interval between injections remained unchanged until April, 1941, when it was increased to 4 weeks. Before 1940 only children under 8 years received A.P.T., but it has since been given to those under 12 years. During 1940 9 cases of diphtheria occurred in children who had received two injections of A.P.T., 1 within three months of immunization, 3 in the third year, and 5 in the fourth following immunization. As a result of this experience it was decided that all immunized pre-school children and immunized children in infant departments should receive a further "safety injection" of 0.2 c.cm. after admission to school or in their ninth year.

At the end of 1941, in the age group 1 - 15 years, 70% of children had been protected, and the following figures show the success that has been achieved by our methods:

Year	Diphtheria		Immunized Children contracting Diphtheria		
	Cases	Deaths	Total	Received Two Injections A.P.T.	Received Other Material or only 1 Injection A.P.T.
1936-7-8 .. .. (average per year)	273	17	—	—	—
1939	72	6	9	4	5
1940	72	7	15	9	6
1941	68	4	11	5	6
1942 (March 31) ..	9	0	2	1	1

It is essential that diphtheria immunization should be efficient, and unless it is the confidence of the public will be lost. The authors direct attention to the necessity for maintaining immunity where there is little diphtheria infection, and a "safety injection" is recommended during the fifth year and again during the tenth year of life. All children should be protected before or just after the age of 1 year, and welfare authorities should see that all parents are advised of the facilities in their area. Once children are immunized before entry to school it is a simple matter to arrange the "safety injections," which should be done through the school medical department. In many cases they can be combined with or immediately follow routine inspection of entrants and the 11-year group.—I am, etc.,

J. T. CHALMERS KEDDIE,
Medical Officer of Health, Oldham County Borough.

Post-war Planning and Winning the War

SIR,—The medical profession is being forced into the position of devoting far too much time, thought, and energy to post-war planning and far too little to winning the war. It is within the power of medical men to produce tremendous acceleration in the industries of war, by preventing wastage of man-power, minimizing incapacity periods, accelerating recovery from disease as well as injury, dealing with both psychological and physical handicaps, inspiring every patient with a sense of the urgency of his duty, maintaining rigid care in the issue of medical certificates exempting from service, stimulating, coaxing, and goading every man and woman to his or her maximum effort. Nearly two million accidents occur in this country every year, and millions of other patients are incapacitated by sickness. If the influence and inspiration of medical men succeeded in reducing the average incapacity period by only one week, the equivalent of a large army of new industrial workers would be

created. Every minute of the time of every medical man should be devoted to this task.

In these circumstances it is deplorable that the fear of a new Act, the fear of an unacceptable State Medical Service, or of any other drastic reorganization of medical service by the Government, should make it necessary for medical men to be urged, as they are being urged, to attend meetings and conferences, to initiate study circles, to issue memoranda, to spend time and thought, and to deflect to the study of post-war problems the energies which should be spent in the problems of the moment. The Prime Minister has given a lead as to the proper allocation of time to post-war planning. Other Ministers should follow that lead. Let the Ministry of Health concern itself with the present emergency and with that alone. Let us first win the war, and when our primary task is accomplished, then let us turn to replanning and to the more permanent improvement of medical service.

I may add that this is not a personal point of view alone. When it was presented to-day to a meeting of 200 medical practitioners, surgeons, and consultants in Liverpool it was received with acclamation and general approval.—I am, etc.,

Liverpool. R. WATSON-JONES.

The Teaching of Anatomy

SIR,—The recent correspondence and your leading article serve to emphasize one significant fact. In spite of a great deal of criticism, constructive and otherwise, extending over a period of many years, the teaching of anatomy has not undergone any radical change. There seem to be two main reasons for this.

First, the question of "unnecessary topographical minutiae." The desire to eliminate these is frequently expressed, but as yet is only a desire. One of your correspondents says that "the anatomist of to-day attaches little value to detail." He may be right, but the current textbooks afford no indication of this. It is not surprising, therefore, that the student, on being confronted with the textbook recommended to him, concludes that detail is important and does his best to try and master it. The need for a fundamentally different type of textbook is urgent: not merely one modelled on the same lines as its predecessors of two or three generations ago, with some additional facts and a few *x*-ray plates thrown in, but one in which anatomists would have the courage of their convictions, and demonstrate to their students (and themselves) that they really meant what they said when they talked about discarding "unnecessary topographical minutiae." Prof. Wood Jones (March 14) is, of course, quite right when he emphasizes the difficulty of securing general agreement as to what minutiae are necessary or not. But are anatomists to allow this difficulty to deter them from ever making the attempt to give concrete expression to what is otherwise destined to remain merely a pious hope? First attempts might meet with abundant criticism and only partial success, but failure to make the attempt is quite certain not to meet with any success whatever.

The second problem concerns the correlation of dissecting-room and clinical work. This really involves two distinct stages, beginning with the application of dissecting-room findings to the normal living body, followed by a comparison with deviations from the anatomical norm as they occur clinically. Most anatomists nowadays accept the principle that the study of anatomy in the dissecting room is not an end in itself, but merely an intermediate stage leading to the study of the anatomy of the living. But it is one thing to state the principle, another to apply it effectively, and the ideal way of doing so has, in most cases, not been attained. Neither in terms of the time allotted to it nor of the relative importance assigned to it in examinations can it be said that the anatomy of the living subject is treated really seriously. The traditional surface anatomy lectures, in which a group of students look on while the lecturer draws coloured lines on a living model, are further proof of this.

The remedy? Primarily a real determination on the part of anatomists and clinicians to collaborate in translating principle into practice. From the point of view of the anatomist, the first desideratum is a considerable increase in the time devoted to the anatomy of the living at the sacrifice, if necessary, of time spent in the dissecting room. The best results—best both because interest is most aroused and because the material is so readily available—are obtained when the students use themselves as models. Within the scope of living anatomy would come such things as percussion and palpation of viscera, identification of muscles (with much of their attachments) and their actions, tendons, arteries, bone and joint movements, correlated throughout with the actual dissection. This is by no means an exhaustive list—examination of the ear-drum, retina, interior of the mouth, vocal cords, radiographic examination of the body, all come within the scope of living anatomy. The living anatomy classes, which can only be efficiently conducted with small groups of students, take up a great deal of time but are exceedingly worth while.

The collaboration of the clinician is needed in the second stage of the process—the provision of clinical material for the study of simple deviations from the anatomical norm. It is preferable that the "academic anatomist" with all his faults (*pace* Mr. Jessop, Feb. 21) should be responsible in large measure for first introducing the student to clinical material, since he is in the most favourable position for integrating clinical findings with those of the dissecting room. As Mr. Wilfrid Adams points out (Feb. 28), administrative difficulties increase if hospital and anatomy department are some distance apart; but with a little energy and good will this difficulty should not prove insurmountable.

One need hardly add that these observations apply to the ordinary medical student training to become a general practitioner. For higher qualifications different standards would be aimed at once the ordinary degree had been taken.—I am, etc.,

Bristol. J. M. YOFFEY.

SIR,—It must be well over twenty-one years ago (nearer fifty, I think) that Lawson Tait asked in a lecture, "What use has 'BODFI' ever been to one of you or anyone else?" Your leading article (March 21, p. 390) expands and answers the question. We stuff the innocent student's mind with "BODFI" and its congeners, few of which can ever benefit him or his patients when he becomes a specialist; in which case he will study the mysteries underlying them at the end of his student career instead of at the beginning, when he hardly knows chalk from cheese. It seems high time to get a move on in the direction indicated in your leader.—I am, etc.,

Ambleside. J. PRICE WILLIAMS.

*** Students and practitioners of to-day may not all be familiar with "BODFI," which was a classical "tip" to indicate the meanderings "backward, outward, downward, forward, and inward" of the middle cornua of the lateral ventricles of the brain.

Loss of Vitamin C in Cooking

SIR,—Evidence is accumulating of a vitamin C shortage among members of the Services and others fed at canteens, although they eat plenty of vegetables. The explanation is found in the faulty and destructive methods of cooking, and it is to be hoped that the opinion expressed in your leader (Feb. 14, p. 227), that *saturation* with vitamin C is not necessary for health, will not be used to minimize the need for a plentiful supply of vegetables and so to defend the methods of cooking at civic restaurants and school canteens under the control of the Ministry of Food. That such a danger exists will be seen from a reply received when the Ministry's attention was drawn to the "soda-boiling" of greens at its restaurants. Referring me to the paper issued by the Medical Research Council concerning the preservation of vitamins in cooking greens the Ministry goes on: "You will note that the paper states that the addition of an alkali hastens the destruction of the vitamins and does not necessarily destroy them all." The method of cooking vegetables for school dinners is even worse than this senseless use of soda in civic restaurants, for these dinners are cooked in the early hours of the morning (starting at 7 a.m.) and kept hot until after morning school. As "keeping hot" is perhaps the surest way of destroying vitamin C, these vegetables are treated as if the utmost destruction of the antiscurvy vitamin was intended.

There is another aspect of this matter, apart from the damage to the health and growth of the unfortunate children. The Crandon experiments demonstrated that extreme fatigue came long before any objective signs of scurvy were manifest or anything was noticeable which would even have suggested that

economic fears, but when patients are carefully questioned it will usually be found that they have not felt well for some time before consulting a doctor. The symptomless extension of pulmonary tuberculosis, found sometimes radiologically among known patients, is another matter, and is explicable by the development of tolerance. Even here careful supervision will usually reveal symptoms and signs—e.g., increased pulse rate after exercise, loss of weight, higher blood sedimentation rate, and so on. It is incorrect also to state that by the time patients come for treatment the disease is in an advanced stage, unless the view is taken that all diagnosable tuberculosis is advanced. It is certainly the case that many persons suffering from tuberculosis are seen with definite symptoms but in whom minimal lesions are detected on *x*-ray examination.

Para. 2.—*X*-ray examination of the chest does not of itself necessarily detect tuberculosis, and this is certainly true of miniature screen radiography, which would no doubt be employed if *x* rays were used on a large scale. All that such an examination could do would be to indicate a departure from the normal, in which case a full *x*-ray and clinical examination should be made. Unfortunately, *x*-ray examination will not detect infection. There is good reason to believe that at the close of adolescence a substantial proportion of the population are infected with tuberculosis, the percentage steadily increasing throughout life. As the number notified or certified at death as suffering from tuberculosis is far less than the number infected, it is evident that a process of spontaneous cure takes place in the majority of those infected.

Paras. 4 and 5.—The statement that re-examination by *x* rays from time to time (each twelve months is quoted with approval in para. 3) is desirable shows that *x*-ray examination can only detect the abnormal when it is present, and is really a confession of its weakness and limitations. If a preliminary examination by *x* rays were made of entrants into industry, students, etc., and the persons kept under regular observation by a medical officer, it is probable that inspection by an expert medical officer, combined with comparative weight and temperature records, would do a great deal to detect the beginnings of disease, and not only tuberculous disease. Again, why should *x*-ray examination, if so useful, be dropped at the age of 18, as quoted with approval in para. 3?

Para. 8.—The last sentence is really a repetition of the last sentence in para. 1, and one or other might be deleted.

Para. 11.—Further experimental work to determine the most suitable type of apparatus is desirable before large-scale manufacture is begun.—I am, etc.,

Leigh, Lancs. GEORGE JESSEL.

Declining Population

SIR,—Everyone will regret that Sir Henry Brackenbury is no longer with us and able to reply to the letter of Dr. Percy Stocks (March 21, p. 394). Against the apparently reassuring figures of Dr. Stocks I would quote the Registrar-General. We find on page xii of his Preliminary Report on the last Census the following statements: "The present rate is definitely insufficient to maintain a stationary population in the future," and, "In recent issues of the Registrar-General's Statistical Review it has been suggested that a current birth rate of about 19½ per 1,000 would be necessary if a future decline in population were to be avoided. The actual level at the moment is 16% below this standard."

The number of the population at present is kept up by the large proportion of old people. It is obvious that eventually the number of children must be the deciding factor. In 1921, according to the records of the Education Office, the average attendance at school of elementary school children in England and Wales was 5,205,485; by 1938 this number had dropped by 678,784 to 4,526,701. A similar and even greater proportionate decline has occurred in private schools. How can we be optimistic in face of such figures as these unless remedies are found?

Dr. Stocks has misunderstood the object of those of us who have called attention to the fall in the birth rate. We do not say "nothing can be done to prevent it," but rather that something should be done. Methods of dealing with the trend of the birth rate require consideration as a whole, but more generous financial consideration to parents of families and extension of physical assistance such as home help to women of any class in all stages of child bearing and child rearing could be put into operation practically forthwith, and would, I believe, have some effect.—I am, etc.,

Eastbourne. W. G. WILLOUGHBY, M.D.Lond.

Diphtheria Immunization with A.P.T.

SIR,—I was greatly interested in the articles on immunization against diphtheria with alum-precipitated toxoid (March 7 and 14), and the authors are to be congratulated on the thoroughness of their investigation. Their findings are of the utmost value, and their recommendations with regard to dosage should be adopted immediately by all authorities responsible for diphtheria prevention.

In Oldham A.P.T. has been in use since January, 1936, two injections of 0.2 c.cm. being given at fortnightly intervals. This was subsequently increased to 0.5 c.cm. for each injection, and later the dosage was altered to 0.2 c.cm. and 0.5 c.cm., which dosage has been used for the last 18 months; the interval between injections remained unchanged until April, 1941, when it was increased to 4 weeks. Before 1940 only children under 8 years received A.P.T., but it has since been given to those under 12 years. During 1940 9 cases of diphtheria occurred in children who had received two injections of A.P.T., 1 within three months of immunization, 3 in the third year, and 5 in the fourth following immunization. As a result of this experience it was decided that all immunized pre-school children and immunized children in infant departments should receive a further "safety injection" of 0.2 c.cm. after admission to school or in their ninth year.

At the end of 1941, in the age group 1 - 15 years, 70% of children had been protected, and the following figures show the success that has been achieved by our methods:

Year	Diphtheria		Immunized Children contracting Diphtheria		
	Cases	Deaths	Total	Received Two Injections A.P.T.	Received Other Material or only 1 Injection A.P.T.
1936-7-8 .. .. (average per year)	273	17	—	—	—
1939	72	6	9	4	5
1940	72	7	15	9	6
1941	68	4	11	5	6
1942 (March 31) ..	9	0	2	1	1

It is essential that diphtheria immunization should be efficient, and unless it is the confidence of the public will be lost. The authors direct attention to the necessity for maintaining immunity where there is little diphtheria infection, and a "safety injection" is recommended during the fifth year and again during the tenth year of life. All children should be protected before or just after the age of 1 year, and welfare authorities should see that all parents are advised of the facilities in their area. Once children are immunized before entry to school it is a simple matter to arrange the "safety injections," which should be done through the school medical department. In many cases they can be combined with or immediately follow routine inspection of entrants and the 11-year group.—I am, etc.,

J. T. CHALMERS KEDDIE,
Medical Officer of Health, Oldham County Borough.

Post-war Planning and Winning the War

SIR,—The medical profession is being forced into the position of devoting far too much time, thought, and energy to post-war planning and far too little to winning the war. It is within the power of medical men to produce tremendous acceleration in the industries of war, by preventing wastage of man-power, minimizing incapacity periods, accelerating recovery from disease as well as injury, dealing with both psychological and physical handicaps, inspiring every patient with a sense of the urgency of his duty, maintaining rigid care in the issue of medical certificates exempting from service, stimulating, coaxing, and goading every man and woman to his or her maximum effort. Nearly two million accidents occur in this country every year, and millions of other patients are incapacitated by sickness. If the influence and inspiration of medical men succeeded in reducing the average incapacity period by only one week, the equivalent of a large army of new industrial workers would be

created. Every minute of the time of every medical man should be devoted to this task.

In these circumstances it is deplorable that the fear of a new Act, the fear of an unacceptable State Medical Service, or of any other drastic reorganization of medical service by the Government, should make it necessary for medical men to be urged, as they are being urged, to attend meetings and conferences, to initiate study circles, to issue memoranda, to spend time and thought, and to deflect to the study of post-war problems the energies which should be spent in the problems of the moment. The Prime Minister has given a lead as to the proper allocation of time to post-war planning. Other Ministers should follow that lead. Let the Ministry of Health concern itself with the present emergency and with that alone. Let us first win the war, and when our primary task is accomplished, then let us turn to replanning and to the more permanent improvement of medical service.

I may add that this is not a personal point of view alone. When it was presented to-day to a meeting of 200 medical practitioners, surgeons, and consultants in Liverpool it was received with acclamation and general approval.—I am, etc.,

Liverpool. R. WATSON-JONES.

The Teaching of Anatomy

SIR,—The recent correspondence and your leading article serve to emphasize one significant fact. In spite of a great deal of criticism, constructive and otherwise, extending over a period of many years, the teaching of anatomy has not undergone any radical change. There seem to be two main reasons for this.

First, the question of "unnecessary topographical minutiae." The desire to eliminate these is frequently expressed, but as yet is only a desire. One of your correspondents says that "the anatomist of to-day attaches little value to detail." He may be right, but the current textbooks afford no indication of this. It is not surprising, therefore, that the student, on being confronted with the textbook recommended to him, concludes that detail is important and does his best to try and master it. The need for a fundamentally different type of textbook is urgent: not merely one modelled on the same lines as its predecessors of two or three generations ago, with some additional facts and a few *x*-ray plates thrown in, but one in which anatomists would have the courage of their convictions, and demonstrate to their students (and themselves) that they really meant what they said when they talked about discarding "unnecessary topographical minutiae." Prof. Wood Jones (March 14) is, of course, quite right when he emphasizes the difficulty of securing general agreement as to what minutiae are necessary or not. But are anatomists to allow this difficulty to deter them from ever making the attempt to give concrete expression to what is otherwise destined to remain merely a pious hope? First attempts might meet with abundant criticism and only partial success, but failure to make the attempt is quite certain not to meet with any success whatever.

The second problem concerns the correlation of dissecting-room and clinical work. This really involves two distinct stages, beginning with the application of dissecting-room findings to the normal living body, followed by a comparison with deviations from the anatomical norm as they occur clinically. Most anatomists nowadays accept the principle that the study of anatomy in the dissecting room is not an end in itself, but merely an intermediate stage leading to the study of the anatomy of the living. But it is one thing to state the principle, another to apply it effectively, and the ideal way of doing so has, in most cases, not been attained. Neither in terms of the time allotted to it nor of the relative importance assigned to it in examinations can it be said that the anatomy of the living subject is treated really seriously. The traditional surface anatomy lectures, in which a group of students look on while the lecturer draws coloured lines on a living model, are further proof of this.

The remedy? Primarily a real determination on the part of anatomists and clinicians to collaborate in translating principle into practice. From the point of view of the anatomist, the first desideratum is a considerable increase in the time devoted to the anatomy of the living at the sacrifice, if necessary, of time spent in the dissecting room. The best results—best both because interest is most aroused and because the material is so readily available—are obtained when the students use themselves as models. Within the scope of living anatomy would come such things as percussion and palpation of viscera, identification of muscles (with much of their attachments) and their actions, tendons, arteries, bone and joint movements, correlated throughout with the actual dissection. This is by no means an exhaustive list—examination of the ear-drum, retina, interior of the mouth, vocal cords, radiographic examination of the body, all come within the scope of living anatomy. The living anatomy classes, which can only be efficiently conducted with small groups of students, take up a great deal of time but are exceedingly worth while.

The collaboration of the clinician is needed in the second stage of the process—the provision of clinical material for the study of simple deviations from the anatomical norm. It is preferable that the "academic anatomist" with all his faults (*pace* Mr. Jessop, Feb. 21) should be responsible in large measure for first introducing the student to clinical material, since he is in the most favourable position for integrating clinical findings with those of the dissecting room. As Mr. Wilfrid Adams points out (Feb. 28), administrative difficulties increase if hospital and anatomy department are some distance apart; but with a little energy and good will this difficulty should not prove insurmountable.

One need hardly add that these observations apply to the ordinary medical student training to become a general practitioner. For higher qualifications different standards would be aimed at once the ordinary degree had been taken.—I am, etc.,

Bristol. J. M. YOFFEY.

SIR,—It must be well over twenty-one years ago (nearer fifty, I think) that Lawson Tait asked in a lecture, "What use has 'BODFI' ever been to one of you or anyone else?" Your leading article (March 21, p. 390) expands and answers the question. We stuff the innocent student's mind with "BODFI" and its congeners, few of which can ever benefit him or his patients when he becomes a specialist; in which case he will study the mysteries underlying them at the end of his student career instead of at the beginning, when he hardly knows chalk from cheese. It seems high time to get a move on in the direction indicated in your leader.—I am, etc.,

Ambleside. J. PRICE WILLIAMS.

*** Students and practitioners of to-day may not all be familiar with "BODFI," which was a classical "tip" to indicate the meanderings "backward, outward, downward, forward, and inward" of the middle cornua of the lateral ventricles of the brain.

Loss of Vitamin C in Cooking

SIR,—Evidence is accumulating of a vitamin C shortage among members of the Services and others fed at canteens, although they eat plenty of vegetables. The explanation is found in the faulty and destructive methods of cooking, and it is to be hoped that the opinion expressed in your leader (Feb. 14, p. 227), that *saturation* with vitamin C is not necessary for health, will not be used to minimize the need for a plentiful supply of vegetables and so to defend the methods of cooking at civic restaurants and school canteens under the control of the Ministry of Food. That such a danger exists will be seen from a reply received when the Ministry's attention was drawn to the "soda-boiling" of greens at its restaurants. Referring me to the paper issued by the Medical Research Council concerning the preservation of vitamins in cooking greens the Ministry goes on: "You will note that the paper states that the addition of an alkali hastens the destruction of the vitamins and does not necessarily destroy them all." The method of cooking vegetables for school dinners is even worse than this senseless use of soda in civic restaurants, for these dinners are cooked in the early hours of the morning (starting at 7 a.m.) and kept hot until after morning school. As "keeping hot" is perhaps the surest way of destroying vitamin C, these vegetables are treated as if the utmost destruction of the antiscurvy vitamin was intended.

There is another aspect of this matter, apart from the damage to the health and growth of the unfortunate children. The Crandon experiments demonstrated that extreme fatigue came long before any objective signs of scurvy were manifest or anything was noticeable which would even have suggested that

Dr. Crandon was developing scurvy. The same thing had been observed by Admiral Sir John Hawkins, who, writing in the year 1569 of the divers ways in which scurvy came, noted that "some show it by their lasinesse." The simple and rapid saturation test described by Dr. Leslie Harris will demonstrate the condition in many who come with nothing more definite than a complaint of being "always tired," "feeling run down"; and many of us will be shocked out of any complacency that all is well on the nutrition front. The effect on output must be serious, and such a brake on effort cannot be afforded to-day. Recently several girls were sent home from munition factories to have their teeth out "because of pyorrhoea"; they were canteen-fed. A few days of massive doses of ascorbic acid enabled them to return with their own teeth, some even without a dental clean up. How many are sticking at their work but doing less than they could if they were well?

Bulk cooking and vitamin C preservation go ill together: the problem is difficult, although not one that cannot be solved. Hawkins lacked fresh vegetables, we the application of intelligence. Cooking is under the care of town councillors and factory managers. They cannot be expected to be familiar with or even aware of the newer science of preservation of the health constituents of vegetables during cooking, when we have only recently known of this ourselves. But if we who know do nothing, our share of blame will be heavy. I wish to suggest that B.M.A. Divisions should form small nutrition committees to study local problems, cooking methods, etc., and then offer help to those concerned. We should greatly strengthen the hands of medical officers of health in their dealings with lay committees. Dr. Murray Scott tells me that such a committee has been formed in Leeds, and it is hoped that other Divisions will follow such a lead. The committee could advise, as an emergency measure, the addition of freshly minced raw vegetables to stews, soups, or boiled greens, when a sufficient supply of vitamin C would be provided.

It is surprising to find that you, Sir, regard dried peas as a source of vitamin C before germination, and that you advise steaming rather than boiling. This is surely not true of any ordinary domestic steamer. Only a remarkably efficient steamer could as rapidly raise the temperature to such a degree as to "inactivate" the enzyme as does dropping the vegetables into boiling water.—I am, etc.,

Grimsby. S. W. SWINDELLS.

Accessory Oxygen Supply

SIR,—In an investigation carried out in 1939-40 of some features of ascorbic acid metabolism in polycythaemia I studied the effects of raising the threshold level of ascorbic acid excretion with sodium bicarbonate, and found that the alkali when used in conjunction with ascorbic acid gave satisfactory results in treatment of the disease (*Journal*, 1940, **2**, 864). With further experience it would seem that the increase in the number of red blood cells is compensatory, due to an inability to transport oxygen to the tissues, and that the definite improvement in the condition when sodium bicarbonate and large doses of ascorbic acid are given is achieved by restoration of this function.

Recently, cases of cardiac or respiratory impairment where the supply of oxygen to the tissues was inadequate were studied, and clinical tests were carried out to find whether the function of the red blood cells was affected by similar treatment. In cases where the oxygen supply to the tissues was insufficient, oral administration of sodium bicarbonate and large amounts of ascorbic acid caused an increase in available oxygen. The effects seemed to be related to cyanosis. Symptoms, particularly cyanosis and dyspnoea, in many forms of heart disease (such as congenital heart disease and mitral stenosis) were wholly or partly relieved. Cyanosis due to sulphonamides was markedly benefited. Improvement was maintained in some cases for a considerable time after cessation of treatment. I am of opinion that these two substances promote an accessory oxygen supply.

Ascorbic acid does not act in this manner when given alone but requires the presence of sodium bicarbonate. I have not studied the action of other alkaline substances. With the assistance of a grant from the Medical Research Council of Ireland investigation is being continued. A preliminary note is published, since the findings are of general interest and illustrate the possbilities of this new use of ascorbic acid.—I am, etc.,

Lurgan. JAMES DEENY.

Spinal Anaesthesia

SIR,—To reply to all the correspondence which followed my paper on heavy percaine spinal anaesthesia (Jan. 31) would necessitate much repetition of what I have already said there. In addition, my critics will find many of their answers in the letter of Dr. W. M. Maidlow (March 7, p. 339) and in one written some time ago by Dr. Gautier-Smith (Sept. 9, 1939, p. 579). I would, however, like to make a few observations on some of the points raised by your correspondents.

In my humble opinion, in the present state of our knowledge, the most gratifying results from spinal anaesthesia, whatever the agent or technique, are obtained in the "good risk" subject. Those who use spinal anaesthesia in the gravely ill will, without doubt, obtain excellent operating conditions, but their patients will give them less anxiety and will die less often if some other form of anaesthesia is used. To the doubters—and they can only be among those whose experience of spinal anaesthesia in grave illness has been limited—I will quote two recent opinions from dozens in the literature. Admiral Gordon Gordon-Taylor says of anaesthesia for the abdominal injuries of warfare (July 22, 1939, p. 181), "only a lunatic would employ spinal anaesthesia." Dr. Langton Hewer in *War Wounds and Injuries* (Edward Arnold, 1940, p. 251) says, "If a shocked patient must be anaesthetized . . . toxic drugs . . . should be avoided . . . and so should spinal anaesthesia." It should be borne in mind that in the ill patient the alternative to spinal anaesthesia is not necessarily inhalation anaesthesia, but may well be some other form of regional block.

The figures I gave of the post-anaesthetic complications were from carefully kept records. Mr. Etherington-Wilson (Feb. 21, p. 274), like myself, must be a little perplexed by the reluctance of recent writers on the hypobaric techniques to give details or figures of the complications they encountered. An exception has been G. Macpherson (*Brit. J. Surg.*, 1939, **27**, 105), and in the details of complications given in this paper Mr. Wilson may find even further cause for foreboding.

I agree with Dr. Loftus Dale (March 7, p. 339) and Dr. Helen Alcock (Feb. 28, p. 305) that no one agent or method of spinal anaesthesia is yet universally applicable, and the expert spinal anaesthetist should acquire the use of several different methods so that he may have an armamentarium from which he can select the right method for the particular occasion. This opinion I gave in the closing paragraph of my paper. Thus, I use heavy percaine for haemorrhoidectomy, but my choice for nephrectomy would be light percaine (1 in 1,500) used according to the method described by Harris and Rink (*Guy's Hosp. Reports*, Jan., 1937).

I earnestly hope that your correspondents and others will try for themselves the heavy percaine technique for spinal anaesthesia, in suitable cases, and form their own opinion of what I and my colleagues have found to be a most valuable form of anaesthesia.—I am, etc.,

Southern Hospital, Dartford. WILLIAM W. MUSHIN.

Haemoglobin of Pregnant Women

SIR,—In reply to Prof. Huggett (March 14, p. 369) I would like to make one or two further remarks on this subject in order to clarify the position which I adopted in my first letter.

Prof. Huggett's first criticism would doubtless not have been made if he had had the opportunity of reading the second letter by Dr. J. M. Alston (March 7, p. 340) before writing his reply to mine. Secondly, by stressing the importance of the hydraemia of pregnancy I had no thought to overlook the possibility of a hypochromic anaemia existing alongside this hydraemia in certain cases. My point was rather the need to look for this anaemia by routine blood examination, and to realize the importance of hydraemia alone as a cause of lowered haemoglobin.

It would be possible to find many examples in the literature to support the findings of Smallwood, but Prof. Huggett must also realize that by quoting Smallwood he does not prove any inaccuracy in the work of Fullerton. The latter was quoted by

me as I think his evidence bears more weight than that put forward by Smallwood. I am glad that Dr. Baxter (March 14, p. 369) is also impressed by the work of Fullerton (*British Medical Journal*, 1936, **2**, 577), which has been quoted.

The iron requirements of pregnancy are again considered by Prof. Huggett in terms of optimal dietary needs, whereas the point I tried to stress was that only a small amount of iron need be absorbed in order to satisfy the maternal iron needs, and this absorption takes place in many if not in most women from diets which contain less than the optimal amount. Coons (quoted by Prof. Huggett) also showed that a daily absorption of 3.2 mg. of iron throughout pregnancy was sufficient for maternal and foetal needs. Kahn (*Lancet*, 1941, **1**, 11) and Lundholm (*Acta med. scand.*, 1938, Suppl., **90**, 380; 1939, Suppl., **102**), whose work was annotated in the *Journal* (1941, **2**, 90), showed that there was no definite relationship between the occurrence of hypochromic anaemia and the iron content of the diet, thus suggesting that other factors, including absorption, are involved. Dr. Baxter has expressed the position well when he says: "If there is one factor which emerges from the investigation of low haemoglobin readings in the ante-natal clinic, it is that such readings cannot always, or perhaps often, be explained in terms of iron deficiency in the diet." And to this might be added the statement that normal haemoglobin readings cannot always be correlated with optimal dietary intake of iron. The position appears to be somewhat obscure still, and while one aims at providing as much iron in the diet of pregnant women as is possible, yet it seems to me unjustifiable to administer iron routine to pregnant women in order to benefit only the small percentage of anaemic ones who can be easily found by examination.

The point at issue in regard to the foetal iron metabolism, which was discussed in Prof. Huggett's first letter, seemed to be the possibility of preventing anaemia in the child during the first few months by the administration of iron to the mother in the ante-natal period. Mackay (1931), who was quoted by Dr. Baxter, is opposed to the possibility of iron administration to the mother having any effect upon the blood of the child. The quantitative results given by Fullerton also bear this out, since the total quantity of iron required by the foetus could only reduce the maternal haemoglobin slightly. Also, since only a small proportion of this iron is needed for storage, it seems unreasonable to suppose that this could be withheld even by an anaemic mother, when she is able (as Prof. Huggett admits) to supply the greater amount required to ensure that the child is born with a full amount of circulating haemoglobin. We have therefore no reason for believing that in this country iron administration to the mother will have any effect in preventing the development of anaemia in her offspring.

Once again, therefore, I would put forward a plea for routine examination of the blood in pregnancy rather than routine iron administration. This latter will not be of any help to us in further elucidating the problem of the iron needs of pregnancy.—I am, etc.,

Hawick W. KERR HENDERSON.

Effect of Haemorrhage on Red Cell Size and Distribution

SIR,—May I reply to the sweeping criticism of my work made by Drs. G. L. Brown, J. A. R. Miles, Janet M. Vaughan, and Col. L. E. H. Whitby (Jan. 24, p. 99), a copy of which has just arrived here. This work was based on observations I made on a series of over 100 long operations, mainly neurosurgical. The observations included measurement of the external blood loss and serial red cell counts every fifteen minutes throughout operation in each case, and blood volume estimations before and immediately after operation in over 50 of them. The estimated blood losses varied from 500 to 2,000 c.cm. and the duration of operation from two to six hours. I found in these patients definite post-operative reduction in blood volume coexisting with marked haemodilution, and simple calculation showed very large numbers of red cells to be "missing." The same apparently contradictory phenomenon, "marked dilution but no apparent restoration in blood volume," was seen in the study of haemorrhage made during the last war. It was recorded and commented upon in the then Medical Research Committee's publications, but its significance was apparently overlooked.

Brown and his co-workers now assert that there is no evidence for my statement because they have repeated my observations on three patients, and, while finding definitely reduced post-operative blood volumes, did not find any appreciable haemodilution. The nature of their operations is unspecified, and their duration and the extent of blood loss are not given, but in no case can have exceeded 3 hours and 1,056 c.cm. These dogmatic statements are the more surprising because rapid haemodilution in response to haemorrhage has been demonstrated by scores of workers. Elsewhere in their same report these authors state that it is easily detectable half an hour after a single haemorrhage. They offer no explanation of why the physiological response to haemorrhage should be different in the operating theatre from elsewhere. It is certainly not because of anaesthesia. Starling taught that the response of tissue fluids was virtually the same to narcosis as to haemorrhage, and I have a series of records which illustrate this. Anaesthesia, in fact, exaggerates the body's reactions to haemorrhage, and therefore makes them the more easy to detect. May I suggest that the reason why Brown and his co-workers found practically no haemodilution in their three cases, providing, of course, that there were considerable blood losses and that the operations were lengthy, is that the patients were suffering from shock and the haemoconcentration of the latter condition masked the haemodilution due to haemorrhage. It was largely to avoid this pitfall that neurosurgical patients were chosen for my investigation, because they alone of surgical cases associated with a large blood loss show the effect of pure haemorrhage.

My second observation was that at the end of these operations the individual red blood corpuscles were very appreciably increased in size. Having made this observation I examined a series of donors to see if a similar increase occurred, but found only negligible changes. It seemed that the amount of blood taken—440 c.cm.—was too small to make this response clearly apparent in the conscious subject. Brown and his colleagues, however, examined 13 subjects donating 440 to 880 c.cm., and did detect increases in 10 of them—an average of 8% increase and a maximum of 13%. To me this would seem to be a definite confirmation of my observation, but they interpret it otherwise. Not finding the larger increases which I observed after bigger haemorrhages in anaesthetized subjects—as, of course, was only to be expected—they assert that only minor changes occur and that they are probably of no physiological importance.

My third observation—that a large proportion of these "missing" cells can be brought back into the circulation—the authors dismiss in an even more cavalier manner, the only work they submit on this point being an undetailed description of plasma transfusions given to two largely exsanguined cats.

The object of my paper was to urge that the practice then in vogue of throwing away blood if it was not used within 10 to 14 days should be stopped, and that the plasma be removed, filtered, pooled, and used in the treatment of haemorrhage. To-day, of course, no blood depot would dream of wasting its plasma, and transfusion with plasma is part of the routine treatment of haemorrhage practised in many hospitals at home and over-seas. While I do not for a moment suggest that I was solely or even largely responsible for the introduction of these practices, I cannot but feel gratified by their widespread adoption. The success of these measures is, of course, no proof of the accuracy of the work which suggested them. My observations may yet be shown to have been faulty, but they are very far from being proved inaccurate by the evidence advanced by your contributors.—I am, etc.,

Malta. H. J. BRENNAN.

Treatment of Fractured Ribs

SIR,—I should like to support Dr. Neal Smith's advocacy of the use of local anaesthesia in cases of simple fractures of the ribs (March 21). It is the only method of treatment which is worth while. As Dr. Smith points out, in the majority of cases the only thing we can and need do is to relieve pain. This is most effectively done by local anaesthesia. There is no occasion to be surprised at the lasting relief of pain which follows the injection. It is true of all fractures and sprains, provided the whole of the originally involved mass of tissues has been injected. Second or third injections are necessary when the pain in a portion of the area involved has been

relieved, not by local infiltration, but by blocking the nerve supply. Infiltration of the whole area is essential. While I have found a freshly prepared isotonic buffered solution of procaine to be best, the infiltration need not necessarily be a local anaesthetic. Normal saline can be just as effective. It is not always satisfactory. It is a painful procedure. The essential of the infiltration appears to be the injection of a fluid.

Dr. Smith may have noticed that whereas the pain (of any fracture) is relieved by the injection, the tenderness remains for up to three weeks. In certain cases the continued pain after the injection of ribs is due to the pressure of muscles such as pectoralis major and serratus magnus, and is in the nature of tenderness rather than of pain. It may be noted in passing that the treatment should be used in all cases of proved or suspected fracture even before radiographs are taken. The pain of contused or of ruptured fibres of the intercostal muscles is as severe as that of a fracture and as difficult to treat by the older methods.

I have long advocated in my hospitals this form of treatment as the only rational one. It should be taught and emphasized, particularly for cases of multiple injuries suffering from shock. Shock is aggravated by the painful impulse at each respiration and by the reduced oxygen intake caused by the shallow respiration induced by the pain and/or by strapping. The change from the pale, sick, worried, fretful patient to that of a contented, smiling individual after the injection will convince the most sceptical of the importance of this measure. It will relieve shock more effectively and more rapidly than any other form of treatment for the fracture or for shock.—I am, etc.,

Manchester. W. SAYLE CREER.

Electrical Factors and Glaucoma

SIR,—May I be permitted to comment on the leading article of Oct. 11, 1941, entitled "The Aqueous and Glaucoma." While there are doubtless many contributing factors in the determination of intraocular tension, any theoretical concept must envisage all the known facts. The variations in tension (up to 30 mm. Hg) associated with "light-adaptation" cannot be satisfactorily explained by the suggestions and ideas that commonly prevail.

The research work that is being carried on at Auckland, N.Z., on the electrical factor in metabolism would suggest that an increased intraocular tension, as the result of colloidal hydrophilization and swelling, in the presence of free molecular entities carrying positive charges, must be given a place in the modern conception of the causation of primary glaucoma.

The new work shows that the sedimentation rate of blood is largely an electrical phenomenon, and it also supports Ehrlich's contention that immunity is an electrical effect related to adsorption. "Adsorption bodies" are formed when the smaller positively charged molecular entities, due to metabolic processes or bacterial growth, are adsorbed on the highly negative and massive pigmentary molecular structures. The number of such positive entities, and the firmness of their fixation to the negative nucleus, vary in different individuals, as the result of degenerative and "insufficiency" factors in other organs. This is the "outside factor" in glaucoma, the existence of which has been postulated by so many independent observers. These adsorption bodies enter the eye with the blood stream and undergo a unique experience there in that they are directly exposed to solar radiation, which in some instances has the power of disintegrating them. Such radiation is also taken up by the pigmentary structures, with a resulting increased "negativity" of the nucleus and a consequent further adsorption of free "positives" already present in the eye chambers. The marked "negativity" of chlorophyll is a good illustration of this, and the variations that can be artificially produced can be readily demonstrated by our sedimentation rate method. Exposure to solar radiation results in a variation in the "free positives," with a consequent alteration in the degree of hydrophilization and swelling of the colloidal contents of the eye chambers, and so of the intraocular tension.

It will be readily understood that the new evidence, ideas, and suggestions arising out of the Auckland work can only be outlined in a letter such as this. For the convenience of those interested, Sections 1, 2, 3, and 4 of the work on "The Electrical Factor in Metabolism" are included with this letter, and could doubtless be obtained from the Editor. Sections 5A (glaucoma), 5M (asthma), 5S (the urea mechanism), and 5T (the immunity mechanism) will shortly be available in similar form.—I am, etc.,

Auckland, New Zealand. W. N. ABBOTT.

Obituary

We regret to announce that Dr. ASTLEY CARRINGTON ROBERTS of Eastbourne died on March 15 after an operation. He studied medicine at Guy's Hospital and at Edinburgh, and qualified M.R.C.S., L.R.C.P. in 1888. He had held a commission as colonel in the R.F.A. (T.), and was honorary colonel of the 58th Field Brigade, Royal Artillery, and the holder of the Territorial Decoration. Dr. Roberts joined the British Medical Association in 1889, was president of the Sussex Branch in 1934-5, and his local colleagues elected him to the central Arrangements Committee for the Annual Meeting of the Association at Eastbourne in 1931.

Mr. ARTHUR CECIL DEVEREUX, honorary surgeon to the Great Malvern Hospital, died on March 17. He was born at Wavertree in 1881 and went to school at St. Oswald's College, Tynemouth, after which he studied medicine at University College, Dundee, at the University of Edinburgh, and at the Middlesex Hospital. He graduated M.B., Ch.B.Ed. in 1903 and took the F.R.C.S.Eng. in 1909. He had been house-surgeon and house-physician at the Dundee Royal Infirmary, and was for a time curator of the Museum of Pathology at the University College of Wales. He served throughout the last war with the E.E.F. in Gallipoli, Egypt, and Palestine, mainly as surgical specialist to No. 53 Casualty Clearing Station. Mr. Devereux joined the B.M.A. in 1904, and was chairman of the Worcester Division in 1928-9; he was also a member of the Medical Officers of Schools Association and a Fellow of the Royal Society of Medicine.

Dr. WILFRID KINGDON, at one time an active worker for the B.M.A. in London, died suddenly at Maidenhead on March 24. He was born at Colyton, Devon, and studied medicine at Newcastle-upon-Tyne and King's College, London, graduating M.B.Durham in 1895 and B.S. in 1897. Dr. Kingdon had been medical officer to Ticehurst Asylum, and mental specialist to the Royal Victoria Military Hospital, Netley, and the Lord Derby War Hospital, Warrington, also at the Boulogne Base. During his temporary service with the R.A.M.C. in France in the last war he was for some time officer in charge of ambulance trains. Later he became a senior medical officer under the Ministry of Pensions. He joined the British Medical Association in 1896, represented the Kensington Division at the Annual Representative Meeting in 1916, and had been joint secretary and later vice-president of the Metropolitan Counties Branch. He took a leading part in ambulance instruction in Kensington and was lecturer and examiner for the British Red Cross Society.

We regret to announce the death of Dr. HERBERT ELLIS ROWELL of West Rudham, who had been a member of the B.M.A. for 54 years, was chairman of the West Norfolk Division in 1919-20, and president of the Norfolk Branch a few years later. He was born at Lee, Kent, in April, 1861, and qualified M.R.C.S., L.R.C.P. from Guy's Hospital in 1882, afterwards taking the M.D. of Durham University. Before settling in private practice in Norfolk he had been medical registrar at the Seamen's Hospital, Greenwich. Dr. Rowell had a distinguished military record; during the last war he commanded the 2/5th Battalion of the Norfolk Regiment, was mentioned for his valuable services, and was awarded the Territorial Decoration. He was also appointed military member of the Norfolk County Territorial Association. His colleagues elected him as their medical representative upon the Norfolk Insurance Committee, and he also served as chairman of the Norfolk Local Medical and Panel Committee.

News has been received in this country of the death on March 11 in Dunedin, after a short illness, of Mr. FERDINAND STANLEY BATCHELOR, F.R.C.S., consulting surgeon to the Dunedin Hospital, who was chairman of the Otago Division of the British Medical Association in 1927 and president of the New Zealand Branch in the following year. He had been a member since 1902.

Universities and Colleges

UNIVERSITY OF LEEDS

The following candidates have been approved at the examination indicated:

D.P.H.—*Part I*: Frances E. Brierton, A. G. Hick, Joan M. Raper, Jean F. Thompson, R. H. Watson.

The following prizes have been awarded:

Edward Ward Prize in Surgical Anatomy, G. M. Williamson. *Scattergood Prize in Obstetrics and Gynaecology*, J. G. Brockis. *McGill Prize in Clinical Surgery* and *Butterworth Prize*, J. G. Brockis. *Hardwick Prize in Clinical Medicine*, G. M. Williamson; *proxime accessit*, J. S. Cason. *Littlewood Prize in Anatomy*, divided between Joan L. Awmack and M. H. M. Harrison. *Infirmary Scholarship*, M. H. M. Harrison. *Hillman Prize in Clinical Medicine*, divided between R. I. T. Lloyd and A. C. Woodmansey.

UNIVERSITY OF LIVERPOOL

The following candidates have been approved at the examinations indicated:

FINAL M.B., CH.B.—*Part I*: Muriel C. Andrews, Stella Booth, Margaret P. Diamond, A. Griffith, J. E. Hall, D. A. Harbord, D. A. Kininmonth, R. V. Kinnish, V. Leitner, Margaret J. Lezama, Barbara K. Thompson, R. S. Williams. *Passed in Separate Subject*: Ethel J. Higgitt and Margaret Slater (Pharmacology and General Therapeutics). *Part II*: Mary A. R. Allan, K. W. Boggis, N. Broughton, E. D. G. Kirkwood, A. J. Robertson (distinction in Public Health), P. L. Robinson, E. Scott, K. H. Slatter. *Passed in Separate Subject*: Stella Booth (Public Health).

UNIVERSITY OF EDINBURGH

The following scheme has been approved by the University Court for the application of the Lawrence M'Laren Bequest for research on brain and nerve trouble. The annual income (about £60) to be devoted to grants to graduates desiring to undertake research in these branches, the research to be carried out under the supervision of the professor of psychiatry. Applications for grants, stating qualifications and particulars of research proposed, must reach the Dean of the Faculty of Medicine by October 1 in each year.

The late Miss Ranolina Stewart bequeathed a legacy of £500, free of duty, for the purpose of research in the department of pathology.

ROYAL COLLEGE OF PHYSICIANS OF LONDON

At a Comitia held on March 30 Sir Charles Wilson was re-elected President.

Diplomas in Ophthalmic Medicine and Surgery and in Tropical Medicine and Hygiene were granted, jointly with the Royal College of Surgeons of England, to those candidates whose names were reported by the Royal College of Surgeons in the *Journal* of March 21.

ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS

Changes have been made in the Regulations for Membership which will apply to all candidates taking the examination after July, 1942. Briefly, the changes are that case records and commentaries must be accepted by the Examination Committee before the candidate may proceed to the examination, instead of as now, when the case records are submitted as part of the examination. The records and commentaries, accompanied by a fee of 5 guineas, must be presented not less than nine weeks and not more than three years before the date fixed for the examination. If they are accepted the candidate may proceed to the examination at any time within the following three years, and a fee of 10 guineas will be payable. A copy of the Regulations, giving further details, may be had from the Secretary of the College, 58, Queen Anne Street, W.1.

The following candidates have satisfied the examiners for the Diploma of the College:

Jean R. C. Burton-Brown, Mona M. Davin-Power, Margaret M. Flecker, Perla Greeves, S. J. Hadfield, R.A.F., Dorothy M. Hicks, Christia F. Lucas, J. K. Martin, Florence M. McClelland, R. J. Mitchell, Eileen E. Perry, E. E. Rawlings, R.A.M.C., Joyce M. Scholefield, Edith Scott, H. A. Shaw, R.A.M.C., Dorothy M. Shotton.

SOCIETY OF APOTHECARIES OF LONDON

At a meeting of the Court of Assistants held on March 24, with Sir Stanley Woodwark, Master, in the chair, Dr. J. P. Hedley was reappointed to represent the Society on the Central Midwives Board; and the following appointed as the Court of Examiners for the ensuing year: Geoffrey Bourne, J. A. Torrens, Archibald Gilpin, G. E. S. Ward, A. C. Perry, W. D. Doherty, Harold C. Edwards, R. M. Handfield-Jones, A. C. H. Bell, C. M. Gwillim, E. P. Stibbe, W. R. Spurrell.

The thanks of the Court were expressed to Mr. T. B. Layton for a silver oval tray, and to Mrs. Earle Newton for furniture designed and made in Australian Jarrah wood by her late husband, R. Earle Newton, F.R.C.S.

The following candidates have passed in the subjects indicated:

SURGERY.—G. E. Barnard, D. I. Fullerton, S. B. Nelles.

MEDICINE, PATHOLOGY, AND FORENSIC MEDICINE.—G. J. Ambrose, D. I. Fullerton, P. R. Green, J. Mason.

MIDWIFERY.—P. A. Eyre, E. R. Jordan, H. Kessel, P. W. Roe, J. J. Wild, E. A. Williams.

The diploma of the Society has been granted to G. J. Ambrose, P. A. Eyre, E. R. Jordan, and H. Kessel.

The Services

CASUALTIES IN THE MEDICAL SERVICES

Previously reported Prisoner of War, now reported Wounded and Prisoner of War.—Lieut. J. M. Knight, R.A.M.C.

Missing.—Lieut. R. L. Lancaster, R.A.M.C.

DEATHS IN THE SERVICES

Surgeon Rear-Admiral WALTER GODFREY AXFORD, C.B., R.N. (ret.), died at Windsor on February 23. He was born in 1861, the son of William Axford, and received his professional education at Westminster Hospital, taking the Scottish Triple qualification in 1885. After acting as house-surgeon and resident obstetrical assistant at Westminster Hospital he entered the Royal Navy, attained the rank of surgeon captain in 1915, and retired, with the rank of surgeon rear-admiral, in 1919. He served throughout the war of 1914-18, receiving the medals and also the C.B. in 1919. He had been a member of the British Medical Association for fifty-four years, and acted as a representative in the Representative Body at the Annual Meetings of the Association held at Bath in 1925 and Nottingham in 1926.

Lieut.-Colonel WILLIAM THOMAS JOHNSTON, R.A.M.C. (ret.), died at Strabane, Northern Ireland, on February 1, aged 88. He was born on December 5, 1853, was educated at Queen's College, Belfast, and graduated M.D. of the Royal University of Ireland in 1875, also taking the L.R.C.S.Ed. in the following year. He entered the Army as surgeon in 1877, became lieutenant-colonel after twenty years' service, and retired in 1906, but was recalled for re-employment during the war of 1914-18. He served in the Egyptian War of 1882, receiving the medal and the Khedive's bronze star. He was a member of the British Medical Association for forty-seven years, and was a representative at the Annual Meetings of the Association in 1909, 1910, 1914, 1917, and 1919, and a member of the Council in 1914-15.

Lieut.-Colonel SAMUEL HENRY WITHERS, C.M.G., R.A.M.C. (ret.), died at Dorchester on February 10, aged 78. He was born at Comber, County Down, on October 13, 1863, and was educated at Queen's College, Belfast, graduating M.B., B.Ch., B.A.O. of the Royal University of Ireland in 1889. Entering the Army as surgeon lieutenant in 1892, he became lieutenant-colonel in 1914, and retired in 1918. He had seen much war service: in the campaign of 1897-8, when he served in the Tirah expeditionary force (Indian frontier medal with two clasps); the South African War of 1899-1902, in operations in the Orange Free State and Orange River Colony, in Cape Colony, and in the Transvaal (Queen's medal with three clasps and King's medal with two clasps); and in the war of 1914-18, when he was mentioned in dispatches in 1916 and 1917 and received the C.M.G. in 1917. After retirement he was employed for some years in charge of the troops at Dorchester. He had been a member of the British Medical Association for forty-five years.

Lieut.-Colonel EDWIN CHARLES HAYES, C.B.E., R.A.M.C. (ret.), died at Bath on February 10, aged 73. He was born in Dublin on September 21, 1868, and received his medical education in the School of the Royal College of Surgeons in Ireland. He took the Scottish Triple qualification in 1894 and the D.P.H. of the London Colleges in 1905. Entering the R.A.M.C. as lieutenant in 1896, he became lieutenant-colonel in 1915, and retired in 1919. He had held the post of clinical assistant in the eye department of Edinburgh Royal Infirmary and at the Royal London Ophthalmic Hospital, and later was an ophthalmic specialist at the Royal Army Medical College. He served in the China War of 1900, receiving the medal, and throughout the war of 1914-18. He had been a member of the British Medical Association for forty-two years.

Lieut.-Col. THOMAS ALFRED OLLIVANT LANGSTON, I.M.S. (ret.), died at Bournemouth on March 16. He was born in 1868, the son of Dr. Thomas Langston of Westminster, and received his medical education at St. Bartholomew's Hospital, taking the M.R.C.S., L.R.C.P. in 1891. After a clinical assistantship at Moorfields

Ophthalmic Hospital he entered the I.M.S. in 1893, became major after twelve years' service, and retired in 1910. He rejoined for service in the war of 1914-18, and was promoted lieut.-col. in 1915. He served in the campaign of 1897-8 in the defence of Malakand and the relief of Chak Darra, was mentioned in dispatches, and received the medal with two clasps; and in the Waziristan campaign of 1904-5 (medal with clasp).

Lieut.-Col. EDWARD OWEN THURSTON, I.M.S. (ret.), died at Budleigh Salterton on March 16, aged 69. He received his medical education at St. Thomas's Hospital, and took the M.R.C.S., L.R.C.P. in 1894, the M.B., B.S.Lond. in 1896, and the F.R.C.S. in 1898. After acting as house-surgeon and surgical registrar at St. Thomas's he entered the I.M.S. in 1900, became lieut.-col. in 1919, and retired in 1927. Most of his service was spent in civil employ in Bengal, chiefly in Calcutta, where he rose to be first surgeon of the Calcutta Medical College Hospital and professor of surgery in the University. He served in the China War of 1900, receiving the medal.

Medical Notes in Parliament

Civilian Sick in E.M.S. Hospitals

On March 24, Mr. JOHNSON informed Mr. McNeil that up to the end of the previous week 3,210 patients had been referred from the waiting lists of voluntary hospitals and treated in associated E.M.S. hospitals. Of these, 1,125 were referred since the widening of the scheme announced at the beginning of this year. The voluntary hospitals were asked to pay only a flat charge of 30s. per patient, no matter how long the patient might remain in the hospital.

Supplies of Quinine

Sir FRANCIS FREMANTLE asked on March 25 what were the probable supplies of quinine and of raw material for its manufacture available under the conditions arising from the loss of supplies from the East Indies, and whether immediate steps were being taken to manufacture efficient substitutes in this country. Sir ANDREW DUNCAN replied that supplies of quinine were adequate for a considerable period. Steps had, however, been taken for the production of efficient substitutes.

Increase of Tuberculosis

In answer, on March 26, to Sir Robert Young, Mr. BROWN said that the causes of the increase in tuberculosis were the subject of a special inquiry at present being actively pursued by a committee of the Medical Research Council. Without anticipating the report it could be said that the predisposing factors were undoubtedly related to the abnormal conditions of living and working in wartime. Both the causes and the action to be taken were highly complex. He hoped to have an opportunity of making a fuller statement on this matter, particularly on the question of early diagnosis, which was of the highest importance and to which special attention was being given.

Ordnance Factory Medical Services

Mr. RALPH ASSHETON, replying to Mr. Messer when the debate on production was resumed (April 4, p. 456), said Sir David Munro had wide contacts in industrial medicine. It had been thought that the Ministry should not lose the advantage of those contacts. Consequently Dr. Amor had been appointed as Sir David's deputy so that the increasing wark of the medical services might be properly administered from headquarters. It was not the case that the doctor in charge of medical services at Woolwich had no previous knowledge of industrial medicine. He had been medical officer at a number of factories. During the past year there had been one resignation from Woolwich. There had also been six transfers of medical staff within the period, all within the Ministry of Supply services, either to the Regions or to the Ministry's factories in the country. Woolwich had been used as a training ground, and it was normal for these people to go out from it.

Sale of Drugs in Multiple Stores.—Sir HERBERT WILLIAMS asked on March 26 whether Mr. Ernest Brown's attention had been drawn to the great increase in the sale of prepacked drugs by chain stores, and whether he would consider taking steps to restrict their sale except by qualified pharmacists. Mr. BROWN recalled that the Pharmacy and Medicines Act of last year restricted the retail sale of some kinds of medicine to certain classes of persons, including pharmacists. He said he would not feel justified at the present time in proposing further legislation to extend the privilege granted to pharmacists. His attention had, however, been drawn to the increase which was mentioned, and he would continue to watch the situation.

Medical News

The first Mexican Congress of Internal Medicine will be held in Mexico City from May 3 to 10 under the auspices of the President of Mexico and the Departments of Education and Public Health with the co-operation of the medical societies of Mexico and the National University.

The eighth Pan-American Child Congress will be held at Washington, D.C., from May 2 to 9, under the auspices of the United States Government. It will be divided into three sections devoted respectively to Health Protection and Medical Care, Education and Recreation, and Economic and Social Services for Families and Children.

A meeting of the London Jewish Hospital Medical Society will be held at B.M.A. House, Tavistock Square, W.C., on Thursday, April 16, at 2.30 p.m., when short papers will be read by Dr. M. Marcus, Dr. A. Herzberg, and Dr. J. Loewenstein.

At a meeting of the London Association of the Medical Women's Federation on Friday, April 17, at 3.30 p.m. in the Centre Room of B.M.A. House, Tavistock Square, W.C., Dr. R. D. Lawrence will speak on modern treatment with insulin.

The annual meeting of the Medical Superintendents' Society will be held at B.M.A. House, Tavistock Square, W.C., on Saturday, April 18, at 2 p.m.

Brig. P. H. Mitchiner will deliver a lecture on "Marching Disabilities" at the Weston Hotel, Bath, on Thursday, April 16, at 5.30 p.m. All Service medical officers and civilian practitioners will be welcome.

The Practitioners' Co-ordinating Committee (*Supplement*, July 12, 1941) is acting as a Study Group of the B.M.A. The group will meet for discussion at B.M.A. House on Tuesday, April 14, at 2.30 p.m., and invites practitioners in the Metropolitan Area to attend.

The Maudsley Hospital Medical School has arranged a D.P.M. course from April 13 to June 5, including lectures and clinical demonstrations at the Maudsley and other special hospitals. The fee is 3 guineas, and applications for enrolment and inquiries should be sent to Prof. S. Nevin at West Park Hospital, Epsom, Surrey (telephone, Epsom 1408).

The times of attendance for out-patients at St. John's Hospital for Diseases of the Skin, Leicester Square, W.C., are: 1 to 3 p.m. Monday to Friday, and, during the summer months, 5.30 to 6.30 p.m. Tuesday and Friday.

The Association of Military Surgeons of the United States celebrated its golden jubilee in September, 1941. The founder of the association was Nicholas Senn of Wisconsin, of Swiss origin. The well-known official publication of this association, *The Military Surgeon*, has commemorated the jubilee in a well-produced and interesting anniversary number (September, 1941, **89**).

The *Medical Clinics of North America* for November, 1941, is devoted to military medicine.

Dr. Astley V. Clarke of Home Close, Lyddington, Uppingham, consulting physician to the Leicester Royal Infirmary, has been appointed Sheriff of Rutland for the year 1942.

Dr. J. Greenwood Wilson, F.R.C.P., medical officer of health for Cardiff, has been appointed a member of the subcommittee of the Central Housing Advisory Committee of the Ministry of Health to discuss the design of houses and flats.

Major Harry G. Armstrong, in charge of research at the United States Army School of Aviation Medicine at Randolph Field, Texas, has been given the John Jeffries award of the Institute of the Aeronautical Sciences in recognition of his researches in the physiological and psychological effects of flying at high altitudes and in high-speed manœuvres.

The Ministry of Health (Circular 2530 A) has arranged with the Ministry of Pensions that persons invalided from the Services for "neurosis," whether or not the attributability of the neurosis to war service has been decided, shall receive treatment in hospital if it is thought that such treatment will help the patient to resume suitable civilian work. The treatment will normally be provided at the Neurosis Centres in the E.M.S.

The late John Burns, LL.D., of Edinburgh bequeathed £10,000 to the Edinburgh Royal Infirmary for the purpose of endowing a principal ward, and after making several private bequests directed that the residue of his estate be paid in equal shares to the Edinburgh Royal Infirmary, the Royal Edinburgh Hospital for Incurables, and the Astley-Ainslie Institution.

No. 11

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended March 21.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no case; a blank space denotes disease not notifiable or no return available.

Disease	1942					1941 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	281	30	45	2	9	330	19	58	1	14
Deaths		4	2				5	4		
Diphtheria	900	30	241	72	27	1,033	49	265	22	31
Deaths	15	—	9	3	—	31	—	11	1	—
Dysentery	146	23	44		—	146	21	25		1
Deaths		—	—	—	—			—	—	—
Encephalitis lethargica, acute	3	—	—	—	—	7	—	2	1	—
Deaths		1	—				2	—		
Enteric (typhoid and paratyphoid) fever						28	—	6	4	1
Deaths						—	—	2	—	—
Erysipelas			60	7	1			46	10	1
Deaths		—	—				—	—		
Infective enteritis or diarrhoea under 2 years										
Deaths	38	6	11	2	2	36	4	10	4	6
Measles	2,980	195	286	91	21	15,056	315	130		23
Deaths	5	1	2	2	2	25	1	2	1	—
Ophthalmia neonatorum	94	4	9		—	—	—	13		—
Deaths										
Paratyphoid fever	13	1	1	—						
Deaths	—	—	—	—						
Pneumonia, influenzal*	1,567	78	39	12	13	1,318	56	43	15	9
Deaths (from influenza)	66	9	15	—	2	132	15	11	2	7
Pneumonia, primary			334	20				506	9	
Deaths				18	7				23	23
Polio-encephalitis, acute	2	—				2	—			
Deaths							—			
Poliomyelitis, acute	4	—	2	—		5	—	1	—	
Deaths			—		—			—		—
Puerperal fever		3	11	2	—	—	—	2	5	—
Deaths		—					—			
Puerperal pyrexia	175	12	21		—	141	7	13		1
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,296	47	204	58	21	1,221	60	163	27	24
Deaths	2	—	—	1	—	—	—	—	—	—
Small-pox	—	—	—		—	—	—	—		—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhoid fever	7	—	—	4	1					
Deaths	—	—	—	2	—					
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough	1,553	189	52	19	7	3,338	55	868		23
Deaths	7	4	9	5	—	38	2	21	1	—
Deaths (0–1 year)	405	42	77			465	37	150	26	35
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	5,639	809	822			6,134	922	841	269	261
Annual death rate (per 1,000 persons living)			18·5		†			18·3	17·9	22·9
Live births	6,523	674	938			5,280	404	859	357	255
Annual rate per 1,000 persons living			19·4		†			17·4	23·7	22·3
Stillbirths	239	28	52			230	16	28		
Rate per 1,000 total births (including stillborn)			53					32		

* Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

† Owing to evacuation schemes and other movements of population, birth and death rates for Northern Ireland are no longer available.

EPIDEMIOLOGICAL NOTES

Discussion of Table

In *England and Wales* there was a general rise in the incidence of infectious diseases, compared with the preceding week. The cases which contributed to the increase in scarlet fever, 36, whooping-cough, 229, diphtheria, 58, and pneumonia, 164, were distributed throughout the country, and there was no notable change in any area. The higher figure for measles, 274, was accounted for by a few counties, the largest local variation being in Middlesex, which had 143 more cases than in the previous week, the chief centres of infection being Harrow M.B. 134, Hendon M.B. 60, and Twickenham M.B. 42. The other counties recording large rises in the notifications of measles were Warwickshire and Northumberland: over two-thirds of the cases in these counties were notified in the county boroughs of Birmingham, 262, and Newcastle-upon-Tyne, 218.

The number of cases of dysentery was 15 in excess of last week's total. During the past few weeks there has been little change in the distribution of the notifications: two-thirds of the total was contributed by London 23, Surrey 29, Middlesex 19, Lancashire 10, and Yorks West Riding 18.

Of cerebrospinal fever 281 cases were notified, or 51 more than in the preceding week. Almost half of the total cases came from the four areas of Lancashire 51, London 30, Yorks West Riding 23, and Warwickshire 22, and spread over fifty-one administrative areas. The largest totals returned by administrative areas were those of Manchester C.B. 12 and Birmingham C.B. 10.

In *Scotland* the figure for measles fell by 32. Of the 286 cases notified, 138 came from Edinburgh and 128 from Glasgow, these totals being respectively 33 less and 22 more than those of the previous week.

Quarterly Return of the Registrar-General for Northern Ireland

The birth rate during the fourth quarter of 1941 was 19.8 per 1,000, being 1.7 above the average rate for the fourth quarters of the five years 1936-40. The death rate of 12.4 per 1,000 was 0.9 below the average of the last quarters of the five preceding years. The infant mortality of 80 per 1,000 live births compares with 73 per 1,000 for the corresponding quarter of the previous year. The death rate from tuberculosis was 0.89 per 1,000, compared with 0.83 for the average of the five preceding fourth quarters. The increase was due to a rise in the non-pulmonary deaths; 213 deaths from pulmonary tuberculosis and 74 from other forms were registered, compared with the average of 211 and 56. The total number of notifications of infectious diseases was the lowest recorded in the last quarters of the past eight years.

Quarterly Return of the Registrar-General of Eire

The returns for the fourth quarter of 1941 state that 13,030 births and 9,164 deaths were registered. These numbers were equivalent to a birth rate of 17.4 per 1,000 and a death rate of 12.3 per 1,000. Both these rates are lower than any recorded in the December quarter during the previous five years. The infant mortality of 73 per 1,000 registered births was 2 below the rate for the last quarter of 1940.

A summary for the whole of 1941 is included in the report. The death rate for the year was 14.7, or 0.5 above, and the birth rate 19.0, or 0.1 below, the rate for 1940. The infant mortality was 73 per 1,000 births, and was 7 above the rate of the previous year. The death rate from pulmonary tuberculosis was 0.9 and from other forms 0.3 per 1,000; the deaths from pulmonary tuberculosis were below the average of the five preceding years, but non-pulmonary deaths were above.

Questions have been asked about the position of nursing in relation to the call-up of women under the National Service Act, as nursing is not included in the list of "options" from which women are asked to choose. The reason is that volunteers for nursing are put in a special position, in much the same way as men volunteering as pilots or observers in the R.A.F. The Ministry of Health and the Ministry of Labour and National Service wish it to be known that all women who come under the National Service Act, or the Registration for Employment Order, may choose nursing at any stage before they actually receive their notice to report for duty. They may apply at any Employment Exchange, at the local hospital, or to the medical officer of health in the nearest county town or county borough, or they can write to the nursing division of the Ministry of Health, Whitehall, S.W.1, giving the number of their National Registration identity card.

Letters, Notes, and Answers

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QUERIES AND ANSWERS

Milk for Steel Workers

Dr. H. D. DOBSON (Chesterfield) would be interested if any readers could give information regarding the value of milk, other than food value, for persons engaged in grinding, brush and spray painting (with no lead content), buffing, sand and shot blasting, in the steel industry.

Income Tax

Recommencing Professional Work

H. S. sold his practice in September, 1938, and lived on his savings for the following nine months, recommencing professional work in May, 1939. During 1939-40 he earned £197 and in 1940-1 £385. He has received notices of assessment for 1940-1 and 1941-2, both of which are in the amount of £385. Is this correct?

*** The basis of assessment as regards a new business or profession—and as H. S. ceased to carry on his profession for a time that basis applies as from 1939-40—is as follows: first year, the actual earnings of that year; second year, the earnings for one year from the date of commencement; third and following years, the previous year. From the facts quoted it would seem that the inspector of taxes is under the impression that H. S. recommenced early in 1940-1, in which case it would be correct to assess him on the 1940-1 figure both for that year and for 1941-2. If he is made aware of the full facts H. S. may be assessed on £197 for 1939-40 and for 1940-1, and on £385 for 1941-2.

Locumtenent's Car Allowance

W. H. has been receiving as locumtenent a salary plus £100 in lieu of board and lodging, and £50 per annum as car allowance. What is the position as regards the last-mentioned amount?

*** If the car allowance reasonably covers the expense it is frequently, and properly, omitted from the assessment as not being remuneration. If, however, it *is* included, then the expense of running it and a reasonable sum for wear and tear are deductible from the gross amount received.

LETTERS, NOTES, ETC.

Fate of a Swallowed Prune

Dr. T. B. MCMAHON (Newport, Mon.) writes: A patient, aged 56, who came into hospital under my care on February 24, 1942, was admitted suffering from acute intestinal obstruction; pain of a colicky nature started on the afternoon of February 21, soon followed by vomiting which persisted until operation. The vomitus became faecal on the morning of February 24, the operation being carried out the same evening. She gave a history of indigestion for several years, and was very obese and had typical signs and symptoms of acute intestinal obstruction situated low down in the small intestine. A laparotomy was decided on. The ileum was found to be very distended, and about 12 inches from the ileo-caecal valve there was an obstruction due to a large rounded hard object within the lumen of the ileum; the intestine was opened and this object removed. On inspection it looked at first like a large single gallstone, but on subsequent examination it was discovered that it was a large swollen prune, measuring 2 inches by 1½ inches. Investigation disclosed that the patient had been eating dry prunes on the morning of February 21, and that she had swallowed a whole dry prune on this occasion.

Dyspeptics and the "National" Loaf

Dr. PHILIP W. G. BAXTER (Cleethorpes) writes: It would appear from recent announcements in the Press that white flour and bread and confectionery made from white flour will shortly be unobtainable. There can hardly be a practitioner in the country who cannot foresee that this will add to the troubles of a group of patients who already find life very difficult. The large group who have to exist upon a permanently "roughage-free" diet—cases of chronic gastritis, peptic ulcer, and chronic ulcerative colitis, and so on—will either have to go without bread, cakes, and biscuits altogether or in some cases take the risk of recurrence of symptoms, and in others the certainty of aggravating an already serious complaint. The B.M.A. has done these patients a great service in obtaining for them from the Ministry of Food priority in the supply of milk and eggs. I suggest that unless similar action is taken to ensure the supply of white bread and flour the good work already done may prove to a large extent to be valueless.

Diagnosis of Whooping-cough

Dr. J. T. MACLACHLAN (Dornoch) writes: I should like to draw attention to a sign of whooping-cough which I believe is peculiar to this disease, and which I have not seen described in medical books. It is a circumscribed swelling on the cheek, just below the eye, readily seen in profile but not on a front view of the face of the child. On several occasions mothers have been surprised when I have diagnosed whooping-cough by this sign alone.

Benzedrine for Eustachian Tube and Middle Ear

Dr. W. S. THACKER NEVILLE (Harrogate) writes: In treating the Eustachian tube it is much easier to inject vapours than fluids. I myself employ at times air heated over a red-hot coil of wire covered with a cap. This is heated by being attached to the cautery handle, and then inserted into the Eustachian-tube catheter. However, before using this one needs a drug to shrink the lining membrane of the Eustachian tube, and the best vapour for that is benzedrine, the makers of which supply ends to screw on the benzedrine inhalers. One end is inserted into the Eustachian tube and the other end is attached to a foot- or hand-pump, which blows the benzedrine into the Eustachian catheter and so into the Eustachian tube (Wood, E. L., *Arch. Otolaryngol.*, Chicago, 1935, **21**, 588). Thus one obtains a shrinkage of the mucous membrane, and if one waits five or ten minutes for this shrinkage to take place, then one can very easily blow hot or cold air into the middle ear.

Foreign Bodies in the Appendix

Dr. F. V. SQUIRES (Wantage, Berks) writes: The appendix has enjoyed a reputation for attracting bodies, including grape-stones, pips, bristles, and threadworms, into its lumen, which is rarely justified on examining the organ after its removal. The following account may be of some interest. I was called to see a woman aged 40, who was awakened at 3 a.m. by violent pain in the right iliac fossa. When I examined her she was complaining of pain and tenderness over McBurney's point. The temperature was normal and the pulse 80. She was admitted to Wantage Hospital and the appendix was removed. The appendix was found lying freely over the external iliac artery. It was four inches long, somewhat oedematous, with injected vessels on its surface. On opening the appendix, eight shot were found lying in its interior—all the shot were of the same calibre. The patient said that she had eaten hare four days previously and two months before that, but was unaware of having swallowed any shot. It would be interesting to know whether all these eight shot were ingested during one meal and found their way directly into the appendix, or whether they had collected there at intervals over a prolonged period.

Botany in the Curriculum

Dr. A. ADAIR writes from Kelly College, Tavistock: I read the *Journal* with great interest each week. I feel that I am perhaps rash in writing, since I am a doctor in another branch of science. I have read a good deal of the correspondence on the teaching of medicine. Since I have from time to time a few pupils for the First M.B. I am venturing to pass several comments. I am completely in the dark as to the virtue derived by my pupils from the botany which they must learn for their First M.B., and would be most happy to discover what advantage it is to the future physician to know the mysteries of xylem and phloem, the development of plants, and the rest of the subject. I have no doubt that it may be good to learn something of Mendelism and sexual reproduction, but is not this adequately covered in zoology? How many physicians remember and employ their knowledge of botany?

Dazzle from Car Lights

Dr. C. KILLICK MILLARD (Leicester) writes: Dr. W. R. Wilson's protest (February 21, p. 280) is more than justified. As he rightly says, no lamp which conforms to the A.R.P. regulations offends in this respect, so if only the law were enforced, this quite unnecessary and most dangerous nuisance would cease. May I suggest that the B.M.A., in the interests of the medical profession, who are so often called upon to drive at night, should approach the Home Secretary with a view to the police being instructed to enforce the law? When one thinks of the many prosecutions there have been for such a trivial offence as failing to immobilize cars, even though the ignition keys have been removed, this failure of the police to prosecute for "dazzle" is hard to comprehend. Neglect by any motorist to have his lamps properly adjusted as regards elevation should be regarded as gross criminal negligence.